The Antique Radio Gazette

OFFICIAL PUBLICATION OF THE ANTIQUE RADIO CLUB OF AMERICA

VOL. 15 No. 1

15th anniversary issue

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It is our intention to have the Gazette published as closely as possible to the following dates:

March 31 — June 30
September 30 — December 30

The closing dates for receiving material of all kinds in order to have it appear in the next issue would be: February 15 — May 15
August 15 — November 15

The Antique Radio Gazette is published quarterly in Madison, Connecticut.

Yearly dues of $12.00 U.S. currency are payable to ARCA January 1, of each year for members in the USA, Canada, and Mexico. Overseas dues are $14, which includes airmail postage.

The Antique Radio Club of America was incorporated in the State of Kentucky, in September, 1972. The first meeting was held at the Marriott Motor Inn, Washington, D.C., on September 23, 1972. At this meeting, by-laws were read and approved and directors selected. We feel that the inception of this Club is a giant step in bringing together those individuals whose chief interest lies in the area of early radio. We invite all collectors and historians of the subject to join the Club. A note to William E. Denk, Secretary, 81 Steeplechase Road, Devon, Pennsylvania 19333, will bring you an application blank by return mail.

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President's Page

Happy Birthday ARCA! This special edition of the Gazette is the fifteenth anniversary issue, and is the largest issue ever issued by ARCA. It results from the cooperation of a number of people, and authorization from the Board of Directors to fund the additional publication and mailing costs. I asked a number of members to consider preparing an article for the special edition. The response was gratifying. In fact, we obtained more articles than can be included in this edition. To those of you who submitted articles that you do not see in this issue, THANKS! They will be included in a future issue. The response from all of you was very gratifying. We should all thank John and Ruth Drake, our editors, who worked extra hard to get this issue put together and printed, and to Bill and Jane Denk who put in extra effort to get it mailed. If you like this issue, let the editors know. And think how you can help to make future editions like this possible. If only one half of the members of ARCA found a new member, we could afford to put out an issue like this every time! That is, if we had authors. The response from authors for this issue shows that it can be done. So, how about we all set out individual goals to support the ARCA goal to be able to issue regularly such an excellent Gazette in the near future.

Elsewhere in this issue you will find the report of the nominating committee. Please read it carefully and vote, either by mail or at the Members' Meeting at the Spring convention.

Planning for the June annual convention is continuing. Committees are at work to make this the biggest and best convention ever held by ARCA. There will be something to do for everyone in the family. A fine program is being planned for the ladies, as well as activities for the collector and historian. Registration material is included in this Gazette. It is helpful for planning and budgeting to get an indication of attendance as soon as possible, so the committee would appreciate your early mail registration. When you register for the hotel, be sure to make it known that you are with ARCA in order to get the special reduced rate, and so ARCA can get credit with the hotel for your registration.

I have had a lot of fun and a few headaches during my several years as your president. I hope that all of you will give our new president your support and help. If we keep working together, and keep our sights high, we can continue to grow in membership, and grow in services that ARCA can provide for the members.

I hope to see a large number of you in Washington in June...

Jim

Our Special Thanks go to Jack Warren, Commercial Artist, for designing the unique cover for this, our Anniversary Issue. Jack has also been responsible for our logos which you see throughout the book.

FOUNDING OF ARCA
by John H. Caperton

For several years before our first meeting at the Marriott in Washington, a group of collectors had been discussing the formation of a new club with a leaning toward collectors, not just "Hams." Needless to say, we have many members who are amateur radio operators. We wanted to have a club that was national or international, with widespread representation as far as Directors were concerned. We also wanted to upgrade the Old Equipment Contest in regard to the various "classes" and judging.

As you know, we have had a very good relationship with the AWA. Some of their officers are on our Board, and we handle their Contest judging.

As mentioned, our first meeting was in Washington, D.C. in September, 1972. There were thirteen people present—myself, Ralph Muchow, Sy Hernandez, John Drake, Mel Comer, Ralph Williams, Emmet Ewing, Bill Offenhauser, Ross Smith, Serge Krauss, Erv Rasmussen, George Greene, Lauren Peckham, and probably more we cannot remember.

It was decided to form a new club which was to be incorporated in the State of Kentucky and to be called The Antique Radio Club of America (ARCA). Naturally, a magazine had to be put out, and at John Drake's suggestion, it was called the GAZETTE. John was thus given the job of being Editor. I was elected President, Ralph Muchow, Vice President, and Sy Hernandez, Secretary/Treasurer.

Our first Meet and next meeting was held at Gene Zimmerman's Holiday West in Harrisburg, Pennsylvania, in June, 1973, at which time we were to have a set of By-laws and Articles of Incorporation to be discussed.

The organization was set up. By-laws and Articles of Incorporation were drawn up. These were discussed at the June meeting. They were altered somewhat and approved. We had a good Meet of about 75 people—and a banquet, and of course, a Contest. Shortly thereafter ARCA was incorporated in the State of Kentucky.

We had our next meeting at Canandaigua in the fall. At about this time, Sy Hernandez resigned as Secretary and Joe Horvath took over the job. Eventually he resigned, and Jane and Bill Denk became our Treasurer and Secretary. They hold these positions today and are doing a bang-up job.

After two years as President, I was succeeded by Ralph Muchow, with Ralph Williams as Vice President. A Board of Directors had been elected which covered geographically the whole United States.

We have come a long way, not only in membership, but in the quality of the GAZETTE, and size and stature of our Contest, and in the judging. Let's keep improving so we can be proud of our organization.

To the members of ARCA,

The nominating committee is pleased to present the following slate of nominees for office in ARCA. If elected, their term of office will start following the election at the annual members meeting at the Spring Convention.

President: Lloyd McIntyre
Executive Vice President:
Rodney Phillips
Vice President: John Terrey
Secretary/Treasurer: Jane &
William Denk
Recording Secretary: Ed Lyon

Respectfully submitted by the nominating committee,
Ralph Muchow, Chairman
Floyd Bennett
Ralph Williams

ARCA's FIRST FIFTEEN YEARS

by William E. Denk, Secretary/ Treasurer

In 1987, THE ANTIQUE RADIO CLUB OF AMERICA, INC. reaches the 15th Anniversary of its incorporation in the Commonwealth of Kentucky. Aguust 31, 1972, is the date on which the Secretary of State of Kentucky certified the filing of our Club's Articles of Incorporation. That date also apprears on the Club's Certificate of Incorporation as issued by the Commonwealth of Kentucky.

The Articles of Incorporation identified John Hays Caperton, II as the Club's registered agent for the service of process, and listed as Directors the following:

John Hays Capterton, II
John E. Drake
Erwin A. Rasmussen
Lawrence E. Whitlock, III
S.E. Hernandez
Serge L. Krauss
Lauren Peckham
Melvin Comer

The Club's first meeting was held at the Marriot Motor Inn in Arlington, Virginia on September 23, 1972. The Club's second meeting, on June 9, 1973, was held at the Holiday West Motel at Harrisburg, Pennsylvania. A total of 31 members attended. A list of members, dated August 1, 1973, shows a membership of eighty-six.

As reported in the November 1972 issue of the GAZETTE, Vol I, No. 1, our first officers were: President–John Caperton; Vice-President–Dr.Ralph Muchow; Secretary/Treasurer–S.E. Hernandez; Publication Editor–John Drake, who remains our editor today. Other editors in past years were Ralph O. Williams and Dick Schamberger. After John Caperton, other past presidents were: Ralph Muchow, Ralph Williams, and John Drake.

Of our Club's 75 Charter Members, 44 were active, paid-up members as of December 31, 1986. They are:

Jack Allison
Ralph Barnett
Richard Brewster
Peter Brickey
John Hayes Caperton, II
Mel Comer
Bill Condon
Donald Daykin
Frank Decker
Dexter Deeley
Bill Denk
Earl Drake
John Drake
Paul Everett
Vernon Freichels
Dan Gaidosz
Paul Giganti
George Greene
William Hennen
Joe Horvath
Stanley Jacobs
Serge Krauss
Thorn Mayes
Ron McClellean
Dave McKenzie
Morgan McMahon
Bob Merriam
Dr. Ralph Muchow
Lawrence Peckham
Dick Ransley
Joe Sabo
Carol Schilo
Emmitt Smith
Ross Smith
Aaron Solomon
Kenneth Spriggel
Ashman Stoddard
Ed Taylor
C.A. Trivette
James VanSant
William Wall
Ralph Williams
James Winnette
Russell Worthy

Since our Club's founding, its membership has risen significantly from the original 75. In 1975 it was 161, but by 1978 that number had roughly doubled to 331. By 1982 our membership had reached 568, and as of September 1986 we had 773 members. That includes twenty-two Canadian

members, and twelve overseas members. Our current membership is greater than that, but a meaningful count cannot be made during the dues payment period.

The Club's ANTIQUE RADIO GAZETTE has also grown during that period. The first three issues, Nos. 1, 2 and 3 of Vol. I, comprised a single sheet of paper, folded to make four pages. The next four, taking us to April 1974, consisted of eight pages each. Vol. 2, No. 4 (August 1974) had twelve pages, as did the next three numbers. Vol. 3, No. 4, December 1975, of 16 pages, was the first to use a cover with two ink colors. Recently, the GAZETTE has been running at 24 pages, exclusive of cover. While the supply of back issues is not complete, most are still available from the Secretary at $2.00 post-paid.

Annual dues, established at the founding, were $10.00 per year. Dues remained unchanged until January 1986 when they were increased to $12.00 per year (in the U.S., Canada and Mexico), and $14.00 elsewhere. The dues increase was necessitated by rising GAZETTE production and mailing costs.

Members may be interested to know that 78% of their dues payments goes for the production and mailing of the quarterly GAZETTE—or about $2.34 per copy. The remaining 22% of Club costs are for such items as printing dues and other notices to members, stationery, election ballots, records maintenance, printing of membership cards and certificates, and postage costs related to the answering of inquiries from prospective members and others, and the actual signing up of new members. It is interesting that the Club's smallest expense, a necessary one from a legal point of view, is the $2.00 paid annually to the Secretary of State of Kentucky to maintain our status there as a corporation of that state.

In general there is no net cost to the Club for its annual conventions. Instead, these meetings are self-supporting, and yield a net profit to the Club.

Since the GAZETTE is the major tie holding ARCA's far-flung membership together, it is in order to conclude this short history with a request that members share their interests and expertise with the membership generally by preparing articles for possible publication in the GAZETTE. Of course, these should be directed to our Editor, John Drake.

OUR NEWEST MEMBERS

John R. Beran, Buckinghamshire, England
Donald L. Taylor, Salisbury, Canada
Robert Stapleford, Topeka, KS
Warren Johnson, Denver, CO
Joseph Cash, Cowpens, SC
Scott Carpenter, Chelmsford, MA
Walter E. Johns, Wellesley, MA
Thomas Romano, Worcester, MA
Gordon S. Creed, Washington, DC
James Cooke, Brighton, MA
Albert Pugliese, Staten Island, NY
Louis J. Takacs, McKeesport, PA
Stuart Mount, Highland, NY
Richard Desjarlais, Littleton, MA
Edward Gable, Rochester, NY
Michael Gram, Hopkinton, MA
Bradly Thomas, Martinez, CA
David S. Bond, Herndon, VA
John Hranichny, Roselle Park, NJ
William S. Haney, Jr., Rolling Hills Estates, CA
George W. Breckinridge, Jr., Naperville, IL
Willard Kratz, Wichita, KS
Michael Smaga, West Haven, CT
Dennis Banker, St. Louis, MO
Allan Sherry, Riverdale, NY
David Berardi, Cos Cob, CT
Jim Hinchley, Ontario, Canada
William J. Groves, Phoenix, AZ
William Euker, Levittown, PA
Mark E. Webb, Palmer, Alaska
Eric Fogel, Bronx, NY
Michael Stephens, Warren, OH

F. Cecil Grace, New York, NY
Jack Casey, Ellicott City, MD
Bob O'Block, Kemah, TX
Akio Isotani, Kyoto, Japan
Richard I. George, Monnetonka, MN
Ludwell A. Sibley, Flemington, NJ
Charly McKee, Clarkston, MI
Michael F. Taylor, Fullerton, CA
Ronald L. Martin, Hummelstown, PA
Vernon Yeich, Whitehall, MD
Daniel Lubczanski, Allentown, PA
Scott B. Shanks, Sherwood, OR
Robert E. Comtois, Windham, NH
Andrew Coleman, Baltimore, MD
Bernhard A. Ziegner, Westford, MA
Herman Zeps, Bluffton, IN
Robert G. Huber, Canton, OH
Peter J. Ben, Lincroft, NJ
Reinstate:
John Bayusik

LETTERS TO THE EDITOR

29 January, 1987
Editor
The Antique Radio Gazette

In reply to Rick Ferranti's letter on page 11 of the Winter 1986 Gazette, the "106 Regenerative Modifier" was a device intended for use with the American Marconi type 106 shipboard receiver, to enable the receiver to operate in the regenerative mode when it was used with an external tube detector. The modifer is described (but not pictured) in Sterling's "The Radio Manual," Van Nostrand, 1st Ed., 1928, p. 453.

The type 106 receiver, a crystal set designed by Harry Shoemaker in 1915, continued in production with minor modifications until after American Marconi was absorbed by the newly-formed Radio Corporation of America early in 1920. Subsequently, General Electric manufactured for RCA the improved type 106-D receiver, which was provided with a tickler coil and was used in conjunction with an outboard RCA/GE type AA-1400 Detector Amplifier.

For those owners of ships previously equipped with crystal-detector 106's who did not relish the expense of a complete new receiver for CW reception, the regenerative modifer was made available. The secondary circuit of the 106 was opened up and brought out to binding posts at the top of the panel for connection in series with the tapped stator coil of the modifier, while the rotor coil was connected as a tickler in the detector plate circuit. The AA-1400 Detector Amplifier was also part of this conversion.

I operated such combinations on several Great Lakes steamships in 1924–25 (SS Alabama/WFB, SS Indiana/WFC, and others). To the best of my recollection, the modifiers in these sets were manufactured by GE for RCA. Perhaps some other old-timer can explain how AK got into the act to produce the unit Rick has unearthed!

Art Goodnow W1DM

KANSAS CITY CLUB SPRING AUCTION ON APRIL 12

The Mid-America Antique Radio Club (MAARC) will hold its big spring auction on Sunday, April 12, 1987. This auction will be at the American Legion Hall, Dwight Cowles Post 370, on 7500 West 75th Street, Overland Park, Kansas. Overland Park is a suburb of Kansas City, Missouri. Metcalf and 75th Street is a major intersection a few blocks East of the Post.

The auction will start at 1:00 PM. If you have something to sell or want to look over the goodies, get there by 12:00. We will charge a 5% fee for all auctioned goods. If you buy back your own items, the fee will still be 5%.

We will limit the number of items or lots which anyone can sell to 12 (twelve). We will not auction late model ham gear, transistor radios, VCRs, TVs, or post WWII receivers unless they have a collectible value. If you are not a member, you will be charged $1.00 to attend the auction.

For those coming in from out of town, the PhD Amateur Radio Club will be holding its huge annual flea market and meeting on this same weekend—April 11 and 12. This two day meet is one of the larger ones in the country and usually attracts over a thousand hams.

Contact Larry Rosine, 13719 Alhambra, Leawood, KS 66224 or 913-897-4015 for more information on this auction.

This saga starts back in 1968 when I was in high school. I saw a Wireless Specialty Co triple detector stand in a local junk shop. The owner wanted $5 for it. Not knowing if it was complete or just part of something else, I passed. Later, the shop disappeared along with the contents, so I forget about the detector stand. Five years later, I was visiting a friend in town and came to find out he had bought the stand but did not want to sell it to me (or anybody else). He died in 1985, so I checked with his widow when she had a garage sale. She didn't know its whereabouts even after a description was given. There was an auction the weekend of Canandaigua, so I got a friend to check out the sale. After four hours, they put the stand up for bid and he bought it for $1.00. I can think of easier ways to save $4.00, although I paid him for going to the sale.

Allen Jochem 2/2/87

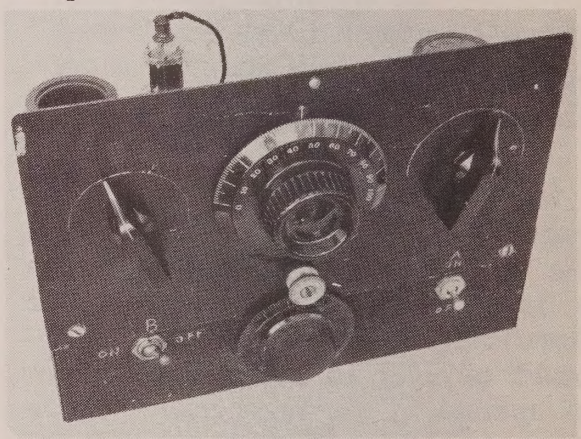
Ralph Williams started on an article about Atwater Kent loud speakers for our Anniversary Issue. We didn't have room for it in the Special Gazette so we plan to publish it in the Summer Issue. Ralph will cover four sections: the horns, the magnetic cones, the early self-standing electrodynamics, and the Golden-Voice electrodynamics. He says there will be some technical material about the designs and quite a bit of identification of which speakers were used in which sets.

RADIO COLLECTING ON A LOW BUDGET

by L.A. Peckham

Believe it or not, there are people in this world who do not collect radios! These include an occasional reporter from a local newspaper and business acquaintances. I enjoy showing off my museum, but the rows of bakelite panels and displays of early vacuum tubes usually produces just two questions that go something like"Say, how did you ever get started in all this, and how much did you pay for all this stuff?"

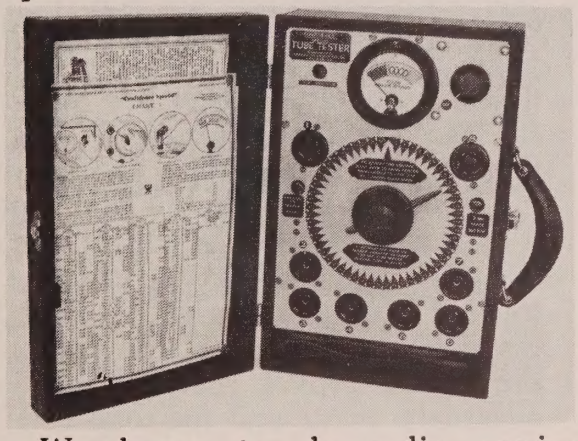
After a bit of thought, I began to realize that my interest in antique radio started long before anyone thought old sets were actually worth money. Nearly fifteen years would pass before the first AWA Bulletin was printed.



Short wave set using parts from an Atwater Kent Model 36

In the early 1940s, my minister dad used to let me ride with him as he visited members of the Georgetown Methodist Church. On one occasion an elderly parishioner was having difficulty with her radio and asked my father to look it over. I still remember my excitement when the speaker was moved to one side and the metal lid removed. Needless to say, this particular AK model 40 wasn't for sale, but it was the oldest radio I had ever seen and my collecting would have started then and there if Mrs. Stuart could have been persuaded to part with it.

A couple of years later, I talked my dad into hauling an AK 36 to our home a few blocks away. This set came from a radio service shop in the great days when people refused to pay more than a few dollars for repairs. Such a receiver often sat in the back room and was eventually junked. The photo shows what happened to the first item I ever collected. It became a 2-tube short wave job around 1946 and was built by my dad from a schematic in the 1944 *Radio Amateur's Handbook*. A hardware store in the same village donated a whole sack of new UX-199s, so I became a tube collector right on the spot.



We began to do radio service around 1945, so the "Confidence Special" became part of our test equipment. It came from the same shop as the AK 36 because the owner felt a need to upgrade.

After a move to Sodus, NY, I decided to start expanding in a big way. The Aeriola Sr. pictured was purchased for 25¢ at a household sale in 1948. Not only did it include a good WD-11, but also a copy of "Practical Radio" by H.S. Williams and two pairs of Stromberg-Carlson headphones. This book became my "Bible" and Armstrong's regenerative circuit fascinated me to the point that several one tube sets were constructed.

Before 1950 I collected several other early receivers including a Freed-Eisemann NR-7 that was still connected to a storage battery and charger. A Zenith VII and several cathedrals soon followed. All of these sets were free, and one gentleman was nice enough to deliver the Zenith and a large Stromberg-Carlson wall speaker to our garage.

Aeriola Sr.—part of the collection since 1948

The little short wave adapter came from an attic along with another converter made by Pilot.

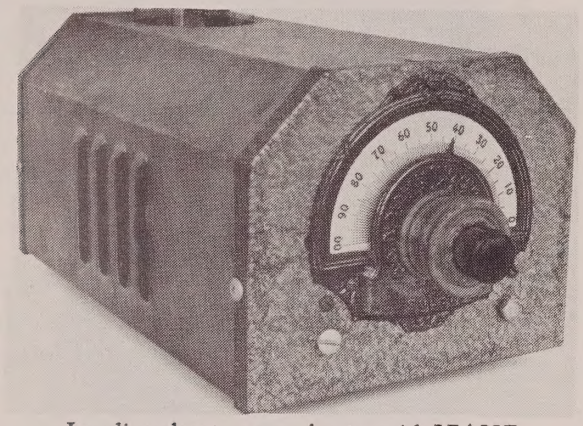
A Western Electric 7-A amplifier showed up at a radio shop in central New York. The owner wouldn't part with the whole unit as he wanted the cabinet for some reason! I did come home with one of the pretty 216-A tubes and a Zenith 4-R! For several years I was convinced that I owned the oldest tube in the world.

One of the things that made radio collecting a bit less lonesome was a new friend, Dick Ransley. I met him in 1947 and the two of us scoured many attics during the six years we lived in Sodus. At that time I had a grand total of approximately 15 radios, including battery and ac sets.

After moving to Horseheads, NY, I took up the search again. A Radiola V was found two blocks away and a Grebe Synchrophase came from a friend near Cortland, NY. The year

was 1955 and neither radio cost a penny!

In the early 1960s, I was still sure that Dick Ransley and I were the only collectors. All this changed in 1964 when I heard about Bob O'Neil who lived in nearby Ithaca.

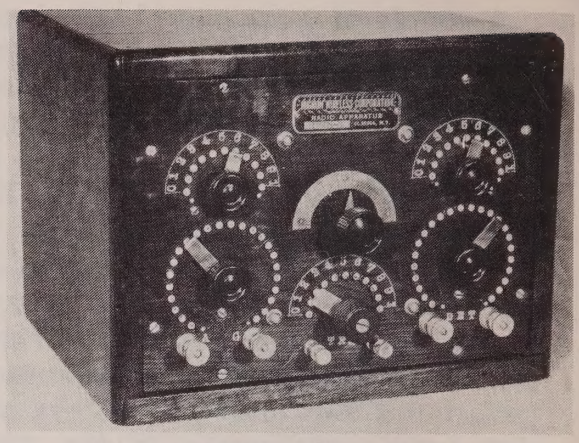


Insuline short wave adapter with UY-227

I was invited to stop over for coffee and view his collection. We climbed a steep stairway and there it was! Rows and rows of equipment I never knew existed. Strange names like Paragon, Clapp-Eastham, and a whole line of the Grebe CR series. There was even an Aeriola Sr., so it now appeared there were at least two in the state!

Bob showed me a fascinating booklet called "A Pictorial Album of Wireless and Radio." My long-suffering wife, Joyce, made sure that Santa Claus gave me a copy for Christmas. I still have it, complete with Harold Greenwood's autograph.

The rest, as they say, is history. I joined the Antique Wireless Association and my interest in old radios branched out to include tubes and wireless items. Ads placed in the classified section of the local newspaper produced wonderful results in those days! During one summer a Grebe CR-9, AK-10, Tuska 225, and a DeForest D-10 showed up and the only one that cost over $5.00 was the D-10. The owner said it was pretty special and wouldn't take a cent less than $35.00. Believe it or not, Joyce and I spent nearly a week trying to decide if we could spend so much for an old radio!



Mignon RLC-2 Special made in 1915

In closing I'd like to mention my first really rare item. I worked at Westinghouse and one of the E.E.s found a Mignon tuner at a local flea market. By this time I had heard the name and even met a couple of old timers from Elmira who had worked for E.C. Mignon as teenagers. I knew this set had to be pretty special and the owner finally agreed to let me look it over, although it was not for sale at the time. Later he agreed to make a trade if I could find a decent upright piano for his daughter. The photo of the RLC-2 proves that a deal was eventually made and the total cost to me, including a rental trailer was about $50.00

A new plateau had been reached and I noted that radio collecting was getting a bit expensive! Wouldn't it be great to go back to those days?

Some day we'll have to talk about the time I was invited to catalog a huge collection of rare vacuum tubes, including a couple hundred UV-201s, WD-11s, spherical audions and some very unusual foreign valves. They were in a loft at a local factory (about 40 cartons!) and it was so hot up there you could hardly breathe. Yes, they all wound up in my museum, but it took a lot of patience.

Then we have the time I heard about a DeForest PN detector, several pieces of IP equipment, etc., but that's another story...

MEL'S CORNER

With the fast pace these days, it seems to take little time for fifteen years to roll on by!

Seems like only yesterday when our old friend, John Caperton, (the founder of ARCA) called me on the phone saying, "With all this group of new antique radio collectors coming on stream, I believe we need an organization directed towards these collectors, in all phases of their collecting activities." It rang a bell! And shortly thereafter the land lines were buzzing from coast to coast!

In no time at all, prominent dedicated collectors phoned in agreements to this great idea, with volunteers to help. But it wasn't easy! These volunteers were scattered all over the country! How do we get them together? We knew most of them—mainly by all the letters we had been exchanging over the years, seeking information and offering to swap this or that set or parts.

There had been other radio organizations as far back as 1912 and a few before then. Prominent was the Radio League of America backed by the famous Hugo Gernsback of the Electro-Importing Co. This organization however dealt mainly with the experimenter of those days. It did provide contacts with members interested in wireless. The usual method then to make contacts was to stroll around your local area—in search of a flat top-four wire antenna! Then ring their bell!

The early "dit-dah" boys at that time—with their Ford spark coils and galena detectors—gathered together in groups and at schools, to do their exploring.

Sure, there were large organizations of well-educated men of means whom we read about in books and magazines, most of which was well over our heads at that time. The real "Ham" amateurs took on in great style following World War I with the establishment of the ARRl—world famous!

It took some years, following the beginning of Broadcasting, for folks to bump across some items of nostalgia stored in their closets or attics—and then realize these were fast becoming antiques! So—it began! The word spread and the word got around. A few groups got together and then they disappeared. A few remain—prominent among them is the International AWA organization.

The founding of ARCA actually goes back to the late 60's with the original planning stages. As it was mentioned before, this was not easy to establish. Fortunately, John Caperton, who is current president of the Veteran Motor Car Club of America, with some four thousand members, knew what it took to set up the ARCA organization on a sound basis. After John surveyed the situation for membership—hired lawyers to take care of legalities—composed by-laws—secretaries—and various sustaining personnel, it became necessary to get together as many as possible of all these scattered folks for preliminary discussion and set-up.

At an early radio meet at Canandaigua, New York, this group got together and finally decided to go ahead with the ARCA project. The first published membership list consisted of twenty-four members. How this list grew!!! It was then decided we would hold our premier national meet in the Nation's Capital—Washington, near the Smithsonian.

September, 1972, a good-sized group showed up from everywhere—which was amazing—and the first formal meeting of ARCA was held at the Marriott Motel across the Potomac. Along with this came a batch of goodies—our first flea market! And

how that batch quickly disappeared as early items showed up. We won't mention the give-away prices at that time!

First time we came face-to-face with all these people whom we had known through correspondence for some years! The meeting was so successful with new members signing up, we knew we were well on our way to a great organization.

Later on it was Harry Houck of Armstrong fame and an honorary member, who contributed considerable financial aid to the progress and future of ARCA. It has been a rewarding effort these past fifteen years to see ARCA grow—and grow it will!!

The Gazette is being improved all along with many new and interesting articles arriving regularly—with more to come! Members seek our ad column—always on the look-out for items that show up there. Lately we have fellows testing our old sets and trying to make comparisons of the efficiency in various models. Takes time to log stations—as well as cleaning up the set, the electrical components, switches, contacts—to arrive at as close to the original specifications as they can. We are finding more and more of this endeavor as questions occur among collectors.

One collector finds only three stations on a Paragon RA-10. Another collector finds 53 stations over the dials. What's wrong? The answer boils down to supposedly clean switch tap points. The difference between age-old contacts—and perfectly clean ones.

Restoring methods—there are as many ideas on this subject as there are collectors! Funny thing—most of them work! It all depends on how you want the surface. We know an AK collector who swears by lemon oil! Why not leave an antique as an antique? Who wants them as they came from the factory fresh—never used—no familiar dust—is it really an antique? Two schools of thought on this—especially when you see an over-polished and scrubbed restoration with brass that was never intended to be super-polished.

Sure—make it look pretty—but DON'T over-polish! Why not make it work? It can be done and the fun is in the trying! Compare it with others you know. Enter it in a contest. Who knows?—a ribbon might appear?

ARCA has opened many channels and categories of radio collections. We indeed have specialists among us who take the time and research to explore all the possibilities and background of the manufacturers. We again see new collectors advancing into the later field of more modern radio and TV with their plastics and art deco items. This is growing and we feel sure it will endure.

ARCA will again be near Washington this year where a great and lively crowd is now expected with a fabulous program! Be sure not to miss this one!!

HAPPY ANNIVERSARY ARCA !!!

Sachem Press Inc., proudly serving as the printer of the Antique Radio Gazette, would like to wish the Antique Radio Club and its members a Happy Fifteenth Anniversary.

ONLY 10¢

by Lloyd E. McIntyre II
Executive Vice President

The year was 1931, the magazine was White's Radio Log. The scene can be set as the farmer, factory worker, office boy or even the President of the United States looks in his mail for this issue. They hurriedly turn to the centerfold to see the program schedule of the Columbia Broadcasting System and the National

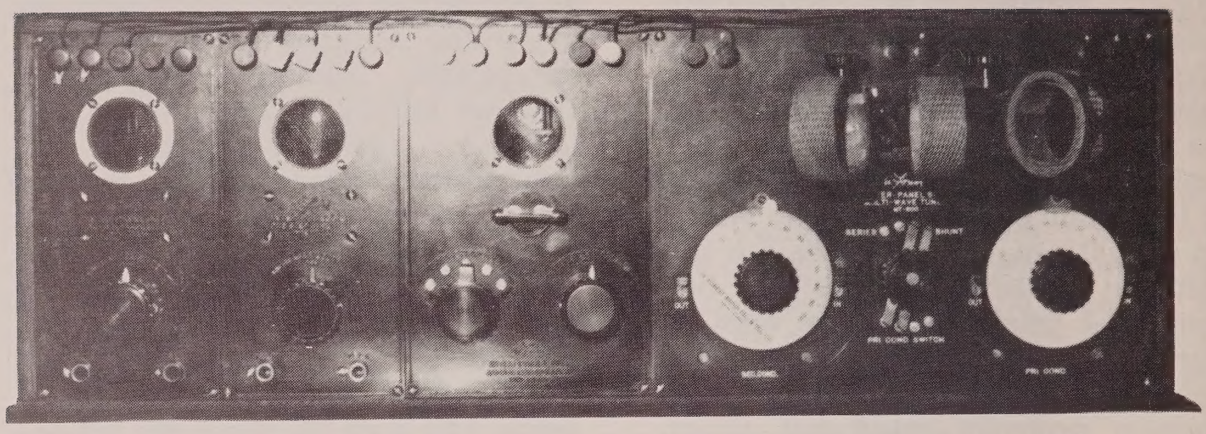
Broadcasting System to see if a new mystery story or musical has been added or if their favorite program has been cancelled by low ratings—"Oh! that such a thing could happen!" One would surely miss "Evangeline Adams, the Astrologer" or that "Weed Tire Chain Program," perhaps even more devastating would be the loss of the "Nit Wit Hour," which came on in prime time, Friday night at 10:30 p.m. Not to be able to wake-up at 7:00 a.m. on Wednesday to the "Musical Aviators Orchestra," but then most people may have been at work by that time and those who were feeling the effects of the Great Depression probably could not afford the batteries for their radio and could have cared less.

How about some of the greats that you cannot tune in on today. The "Atwater Kent Hour," "The Pepsodent Program featuring Amos 'n Andy," "Pure Oil Orchestra," "Mobil Oil Concert," "General Electric Hour," "Rin-Tin-Thriller," "Back To The News in Washington," just to name a few. Many lives were enriched by the only means of entertainment that millions of Americans had in that very strange and trying year. Some few programs may have survived the ratings and live today. The "RKO Theatre," now the RKO Network, "The World Today," "Coca-Cola Program," not like then, but "Coke Is It," wherever you look today. In looking over my radio log, I see that there are several programs we need to revive—8:00 p.m. Sunday, "The World's Business," "Be Square Motor Club;" Wednesday at 7:45 p.m. sharp, the "Eskimo Pie Program," and then at 11:00 p.m. our national New Year's hero, "Guy Lombardo and his Royal Canadians;" "Literary Digest Topics In Brief—Lowell Thomas." For the many years that some of these people and programs were a part of American life and culture, never will so few influence, infatuate and mold the character of so many and stand as monuments during the birth of a nation in the post-Depression Years. "RADIO," it had it all! It allowed you to continue with the chores at hand, be entertained without being insulted, captivated without seeing someone decapitated. Brought to roaring laughter without coarse and profane language, information without disinformation, carried back without being carried out. 99% of the programs of the Golden Age, if produced for television today, would not last two weeks. There is not enough violence, sex, coarse language, Jack & Dave, Mary & Alice, blood, guts, and busted heads. Out with the radio and White's Radio Log. Replace it with "TV Guide" and its inside stories and color television that reveals it all from Playboy to Watergate. From "Dallas" to the "Equalizer," we have come of age—we do not need radio?? Or do we? The concept of programming of those days is gone. The wood and plastic boxes with some wire, dials and funny looking light tubes that only glow are destined to the scrap heap of the ages. Only a few will survive 25 years from now. It's nice to remember, pleasant to talk about, and the focal point of a few old timers who really know what it was all about; and some, like me, who would like to think that we know, but will never really appreciate. What of the next generation—not even a faded memory, let alone a squall or squawk from a super-reign. All is not lost, it brings us few strange creatures together once a year for a revisit to those bygone years. I am sure you have noticed that no one sets up a TRF and tunes in on whatever there is to tune in on these days at a meet. We all retire to our rooms and flick on the gloom tube.

May the blessings of friendship made and endured and the growth of our organization be as great the next fifteen as the past fifteen.

RESTORING MY DeFOREST INTER-PANEL

by Floyd Bennet and Alan Douglas



When I found my three-tube DeForest Inter-Panel set with Multi-Wave Tuner MT-200 in an estate, I was very happy. Its oak cabinet with its four section panels was in excellent condition, complete with the DeForest emblem on top of the cover. The primary and secondary panel all-in-one was complete with all its components. The three remaining panels had all parts and components missing, inside and out.

Since I have my own machine shop, complete with lathe, drill press, vertical mill, band saw, and other equipment, I was able to make the missing components. I had aluminum stock on hand, but had to purchase or locate rheostats, tube sockets, telephone plug adapters, transformers, Bakelite Battery Connectors, brass screws and nuts, and grid condensers. I used black phenolic for making the four rehostat knobs. This matches the original Bakelite dials. With my lathe and vertical mill, I was able to produce rheostat knobs with pointers and twenty equally spaced radiused grooves on each. I made three aluminum rings to hold the brass screens in place on the front of each panel section. These holes make the light from the tubes visible when the power is on. I made a punch and die to enable me to produce three round screens, which have to be held in place with rings and screws mounted upon each of the three panels.

For the mechanism on the inside, six angles with four holes drilled in each, had to be made and machined. I made three textolite blocks and mounted them upon the angles. Three tube sockets were put in place over the angles. Two transformers were mounted underneath the two sets of angles. Four phone jacks were also installed. After all the components were built, mounted, assembled, and the wiring with its twenty-two connections to all components was completed, my set was ready to operate.

The front panel, complete with its DeForest Honey-Comb Coils, its several dials, the three brass screens with screws, makes a very nice looking unit. The beauty of this set is that is operates well on one tube, two tubes, or three tubes. Incidentally, the rings holding the brass screens were meant to be mounted on the inside of the panels, but I mounted them on the outside. Even though this makes the set less authentic, I, personally, like the appearance of it better.

In closing, I would like to give much credit to my good friend, Alan Doug-

las, for supplying me with the history of this DeForest Inter-Panel. His information accompanies my article.

The Interpanel: In the right place at the right time

Back in the early twenties, when most radio fans were technically-minded, if not actually amateur radio operators, many manufacturers made modular sets, a halfway point between selling individual components and selling complete (but very expensive) radios. Most commonly, the tuner was in one cabinet and the detector-amplifier in another, but each major component could be in its own box (Amrad, for instance), or each stage could be separate (detector and the audio amplifiers). DeForest chose this last arrangement for its Interpanel: the fan would buy one cabinet, with a tuner, then add detector and ampliier stages as finances permitted, or he could choose a whole combination at once (even a transmitter was offered). Without a lot of separate cabinets to buy, this would be a good deal cheaper than the Amrad plan of wiring up six or a dozen units of variometers, tube controls, couplers, etc. Amrad's plan had been notably unsuccessful.

Unfortunately for DeForest, most fans bought their radios all at one time, and in the standard combination of tuner-detector-two step audio amplifier, so this "interchangeable panel" idea had few advanatages. As a further disincentive, DeForest was prohibited from using the regenerative circuit, Lee de Forest being locked in battle with Armstrong at the time (the purchaser could of course rewire the set to make it regenerative but the company had to be careful not to officially suggest this while the courts were watching). Fans stayed away in droves. During 1921, when DeForest advertised nothing but Interpanels, it lost $25,827 on sales of $108,439.

Then the radio boom hit, at the end of 1921 and in early 1922. Suddenly broadcasting swept the country, dealers' stocks disappeared overnight, and anything would sell to the hordes of fans. Even Interpanels. DeForest unloaded all of its old sets in stock, and probably made plenty of new ones too, since the designs and tooling were all ready. The next year, 1922, in just a few months of activity, the company posted profits of $288,532 on gross sales of $538,771 and paid its first stock dividend since the flush years of wartime contracts. While most other companies were a few months too late to cash in on the boom, DeForest (with Grebe, Westinghouse, and some others) made the most of its lucky break.

WASHINGTON: A CELEBRATION OF THE BIRTH OF ARCA AND A WHOLE LOT MORE

by Ed Lyon
Mid-Atlantic Antique Radio Club
ARCA, AWA, SCARS, PARS

We're celebrating ARCA's fifteenth anniversary this year, and our return to the nation's capital for the ARCA convention in June is a significant homecoming, for ARCA was born in Washington. The site is fitting, too, because a significant part of radio's history had its basis in Washington.

For Washington is the headquarters of the U.S. Navy, and the Navy provided not only the imperative behind nearly all U.S. wireless efforts, but also a substantial part of the financial support and actual laboratory work toward the development of radio, from the period before the first World War through the 1930s. We will touch briefly on some of the more important Navy work in early radio, but first, let us look at a controversial pioneer in wireless com-

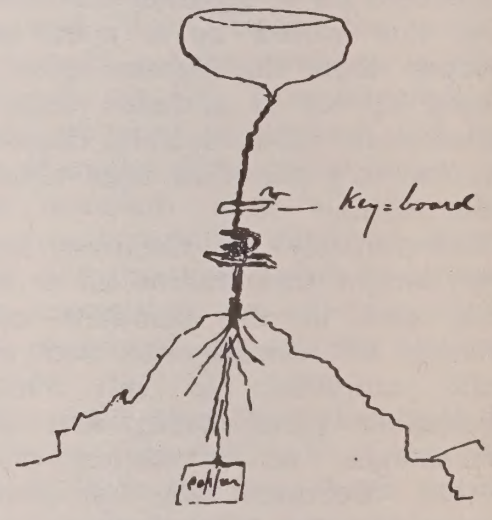
munication, one who, too, did his work in Washington.

This pioneer was Dr. Mahlon Loomis, a Washington dentist who "got bitten" by the electrical communications bug while attending lectures on electricity given at Lowell Institute, now Lowell University, in the 1853-54 semester [1]. He was apparently fascinated by the idea, discovered some years before, that telegraph systems could operate with a single wire, provided good grounding of the returns was made, the circuit completion being effected by the single wire plus the diffuse return path through the earth. He surmised that there was a layer of the atmosphere that similarly conducted electricity, and that lightning strokes resulted when the voltage difference between the two conductors, the atmospheric layer and the earth, exceeded the Almighty's design value. Why not, then, use this atmospheric conductor as the telegraph wire, and that way there wouldn't be a need for any wires at all, he reasoned.

He had a successful dentistry practice going for him in Springfield, MA, in the late 1850s, following short, but successful, stays in Cleveland, where he first studied dentistry; Earlsville, NY where he first practiced, and, finally, Cambridgeport, MA. After his marriage he moved to Philadelphia, but within a couple of years he moved his family to Washington. He had received several patents in the field we now call dental prosthesis, and was soon a success in Washington. A summer cottage on the Blue Ridge, in Virginia, became the site where he experimented with the "atmospheric battery," as he termed the supposed atmospheric conduction layer and earth combination. He had first tried tapping the energy of this "battery" in West Springfield, MA, through elevated wires connected to plates buried in the ground. Townsfolk were amazed at the production from his garden, attributed to the effect of the captured electricity [2]. Modern science today would tell us that such a grounded aerial wire system "attracts" lightning and corona discharges from passing clouds, and both tend to produce nitrite and nitrate ions from the air. Both are soluble in rain and are good fertilizers.

Now, here is where the controversy begins: Did Mahlon Loomis actually send and receive messages via radio waves in the mid-1860s? Or did he simply make, and detect, electric field perturbations?

In 1864, Loomis put together a schematic diagram of a telegraph circuit without wires, and he planned a test of this wireless telegraph for some time when the weather was clear, the test to take place along the Blue Ridge. He thought that the attainment of some altitude was important to getting his "aerial" wires into the conductive layer. This diagram, shown in Figure 1,



Loomis sketch of Transmitter/Receiver—1864

resides in its original form with a bundle of his sketches and handwritten notes in the manuscript section of the Library of Congress. It is unclear just what the apparatus (labeled 'key-board') connected between the aerial and ground plate is

supposed to be. Several Loomis biographers have suggested that the apparatus in question was a spark generator of some sort, probably because of apparently insightful statements by Loomis a few years later. These statements, dated 1871 [3], describe "waves" of electric energy which "radiate" outward as ripples from a pebble dropped into a still pond, a concept amazing for the time, it being before Hertz's experiments. This is the concept that tempted several Loomis biographers, including the late Commander Thomas Appleby, who wrote of Loomis in 1967 [1], Elisha Loomis, a relative who wrote a biographical sketch in 1914 [4], and Mary Texanna Loomis, a distant cousin, who wrote RADIO THEORY AND OPERATING, a text for her Loomis Radio College, in 1925, to claim that Loomis' successful tests of his wireless telegraph were based on spark-excited radio wave generation and reception.

A better look at his 1865 experiment from Bear Den on the Blue Ridge (near Front Royal, VA) to Catoctin Spur (just across the Potomac from Point of Rocks, MD), is given [5] in his own words and sketches, a pair of which is shown in Figure 2. It shows that he more probably worked with perturbations of the earth's vertical electric field. This first test, duplicated several times over different paths, involved two identical metallized kites each holding aloft an aerial wire. The bottom end of each wire tether was connected to a galvanometer, whose other terminal was connected to a good ground. By removing the aerial from one galvanometer (the sender), leaving the other (the receiver), connected, the opening and closing of the sender circuit (to its galvanometer) registered as deflections in the receiver galvanometer. Certainly, as Commander Appleby notes [3], sparks due to collected static electricity occurred upon connection of the 600-foot aerial to the grounded

Loomis sketches showing transmitter (top) and receiver (bottom) used in 15 mile wireless telegraphy experiment—1865–66

galvanometer, but it isn't at all clear that Loomis was outfitted to detect spark emanations. However, it is clear that a tall aerial, if suddenly grounded, will perturb the surrounding vertical field, which normally rests at 300 volts per meter, enough so that another nearby aerial wire will have its induced voltage changed. In the early 1930s, Mary Texanna Loomis, while teaching classes in radio technology at Loomis Radio College, would describe later, apparently undocumented, experiments of Dr. Loomis, in which he used an "electrostatic mill" to detect the transmissions over the 60-mile path from his office at 9th and Pennsylvania Avenue, Washington, to the Blue Ridge cottage [6]. This further implies that it was the field perturbation he detected since the eletrostatic mill was a sensitive device for measuring small changes in an electrostatic field.

Loomis may not have understood what made his "aerial telegraph" work, but his write-up of its principles, repeatedly recited before Congress

by Representatives Bingham and Conger, during sessions from 1868 to 1872, clearly employs the "ripples on a pond" simile, even stating that the ever-expanding ripples induce currents in any receiving aerial which intercepts the waves. But we all know that it isn't necessary that an inventor know how or why his invention works (or how would deForest have fared?). Loomis was, probably, the very first to achieve wireless telegraphy, and he invented the Marconi antenna in the process.

But, now we take a look at some slightly less controversial radio pioneering in and about Washington.

Everyone knows how the U.S. Navy tried to commandeer the entire wireless business in America as a result of our entry into the first World War. The creation of RCA was a direct outcome of that episode in the Navy's history. But the need to share the spectrum with the civilian population focused the Navy's needs, and the Navy then flip-flopped from coveting all the low frequencies, thought by Marconi and many others to be the key to DX, to a serious try for all the high frequencies, once it was realized that THEY were the key to DX. And it was the Navy, led by the hams, who found out the facts about DX and high frequencies, or short-wave radio.

It may come as a surprise to many short-wave students to find that England's Appleton and Barnett were NOT the first to prove the location of the ionosphere, by radio-sounding, in 1925. This ionized region had been postulated to exist by England's Oliver Heaviside. For two Americans, Breit and Tuve, working for Washington's Carnegie Institution, successfully sent and received pulsed high-frequency radio waves reflected from the ionosphere nearly a month before the work by Appleton and Barnett [7]. Breit and Tuve were out to try to locate that same ionosphere, as postulated by MIT's Kennelly. The significance of this work is profound, for it led to true wide frequency range ionospheric sounding practice, which has solidified all our knowledge of the propagation of short-wave, or high-frequency (HF) radio signals. It is curious that immediately after the work by Breit and Tuve, American scientists began calling the ionosphere the Kennelly-Heaviside layer, but the British called it the Heaviside layer, likely finding it difficult to pronounce 'Kennelly.'

The work by Breit and Tuve was done not only with the assistance and support of the Navy, specifically Washington's Naval Research Laboratory (NRL), but both the transmitter and receiver used by them had been designed and built by A. Hoyt Taylor and Leo Young, two founders of NRL, and two first-rate hams, who operated 3WV. These two scientists were the first to observe "backscatter echoes" from pulsed short-wave transmissions, and the first to prove the existence of round-the-world short-wave propagation, based on timing the "echo" received from their transmissions from Bellvue, as NRL was called. These developments form the historical basis for radar, and especially HF or Over-the-Horizon radar [8].

So our capital city was the birthplace of many significant events in the history of radio. The broadcasting of the world's timing standards, first from NAA, then from Beltsville's WWV, were the least significant of these events. The birth of ARCA, let us trust, will be noted by historians of the future, as one of the more significant.

[1] Appleby, Thomas, MAHLON LOOMIS, INVENTOR OF RADIO, p.2, privately published, 1967, L/C No. TK5739.L7A6.
[2] ibid.
[3] Bill H.R. 772, 42nd Congress, 1871, reported in Congressional Globe, Dec 20, 1872, pp. 3667–3670.
[4] Loomis, Elisha S., DR. MAHLON

LOOMIS & WIRELESS TELEGRAPH, Berea Printing Co., Berea, OH, 1914.
[5] Mahlon Loomis Collection, Lib. Congress Manuscript Div.; also related in Appleby, op cit. pp. 8–21.
[6] Related to this author by the late Ralph Whelan, student of M.T. Loomis in 1931–32, in August, 1959.
[7] Breit, G. and M.A. Tuve, "A Radio Method of Estimating the Height of the Conducting Layer," NATURE, 116, 357, London, 1925. (NOTE: Also, nearly lost in history was the first experimentally-based deduction that a conducting layer of the atmosphere exists, by L. Fuller and L. deForest, based on work at the Federal Telegraph Company, Palo Alto, CA, in 1912–14. DeForest's computation of the location of the layer was flawed by his biased view of radio wave propagation, however.)
[8] Gebhard, Louis A., NRL Report 8300, "Evolution of Naval Radio-Electronics and Contributions of the Naval Research Laboratory," Washington, D.C., 1979.

HOW TO WIN CONTESTS

(Well, how to increase your chances, at least)

by Alan Douglas

But doesn't the best entry always win? If so, the "secret" is simple: you bring the best entry, you win. Unfortunately...there are several possible reasons why not: (1) Different judges have their own opinions of what's best, (2) The rules may change, and (3) The judges may make a mistake.

For (1), there's not much you can do, especially if your collecting tastes are off the beaten track. *You* may know that a Grebe CR9 is a far better set than a contemporary Cutting & Washington 11 (which it is, in every way), but the judges who all own CR9s and would give their eye teeth for a C&W 11 aren't likely to agree with you. Don't fight it.

And you can never predict how an entry will stike a particular judge. For instance (I have to be careful in choosing examples, so as not to offend the entrants involved) John Terrey put a toy Tesla motor in the last AWA contest, though it obviously had nothing to do with Nikola Tesla himself. But it was in the original box, and had some paperwork with it, and I thought it was a perfectly legitimate entry, in that it showed how "generic" Tesla's name had become, in the early years of this century. However, the judges dismissed it right away, as in no way qualifying for a prize. I'm not saying they're wrong, only that opinions differ. To take another category in the same contest, telegraph gear...what is "best:" one particularly rare and significant piece, or a group of individually-somewhat-less-significant pieces that may add up to more?

There is *absolutely* nothing you can do about (2), except to bitch to Ralph and get the rules changed for next year. To quote an example, which I remember since it happened to me, back in the dark ages the contest categories used to be divided into cyrstal-regen-TRF-super, more or less (they are now divided by number of tubes, regardless of circuit). If you were entering an Operadio 2, what would you call it? I guessed it was a TRF, but no, it was *un*tuned RF, and didn't qualify. Neither did the Schambergers' incredible Federal 61 prototype...that was untuned RF also. Sure fooled us.

Now the only way I can quote examples for (3) is to share my own goofs, and there's no lack of those. Because the judges *do* make mistakes. There was the time we awarded a blue ribbon to a three-dial Ozarka, because it looked nice and had an instruction manual with it. The first comment I heard, when the

viewing began, was "Where's the rest of it?" The entire bottom of the cabinet, where the batteries went, was gone! As I recall, Bruce and Charlotte got the second-place that day, for what should have taken a blue ribbon.

That was unfamiliarity with the set, which normally isn't a problem for the standard categories. But for the special clases, it can be. Judges are chosen for a wide range of expertise but no one knows everything, and inevitably they will be judging unfamiliar categories. I'm no telegraph expert, and neither were the other judges at the last AWA meet, as far a I can recall, though I think we did all right just the same. Likewise, there were no transistor experts among us, and there, I'm afraid we dropped the ball, by underestimating Jim Troe's Western Electric superhet, home-brewed by their engineers to show that the new transistors would work at high frequencies.

Which brings me back to the title. We didn't know what we were looking at, and the exhibit really didn't tell us. If you want to win contests, you have to educate the judges, at least for the unusual categories. That's one of the values of documentation. Just be sure to make it snappy, because you wouldn't believe how little time the judges have to look at each entry. I know that to those peeking through the door at noon, they seem to take forever, but up to 10:00, when the last entries invariably arrive, they can't do anything, and the next hour or more is taken up in re-arranging the room to fit everyone in the designated spaces, and scrounging tables the Sheraton hasn't seen in years (the last one had two short legs).

Competing in contests is fun, but you shouldn't take it too seriously, since you're putting your fate in others' hands. Besides, you can have the last word, say anything you like, and show off your prizes to a much wider audience, not by entering a contest where you have no say, but by writing an article!

COLLECTING IS WHERE YOU FIND IT

by Lester P. Rayner

Moving out to Arizona some years ago and adjusting to the climate and the new surroundings, I acquired an interest in my present hobby of early radio. However, this interest was aroused only after meeting and talking with my newfound friend, Bill Pugh, who has been a collector for a number of years. Bill had a good number of old sets and speakers which whetted my curiosity about collecting antique radios.

It was then that he told me about the various Antique Radio Societies that existed and how fellows bought/sold and traded for these sets.

Most of Bill's radios and speakers were collected from the East and Middle West.

I guess I had always been attracted to articles that were antiques and so my interest in Antique Radios was a natural, but living in Arizona I had some misgivings about finding any collectible pieces.

To make my point now, I would like to tell the individuals who are just starting out collecting that if you are really interested and beat the bushes, you'll be surprised what you will find.

It's now that I would like to relate to you how I found some interesting items here in Arizona.

One of my first finds was a Bunnell (KOB) key on box which I found at just an ordinary Antique Show at one of our shopping malls here in Phoenix.

The Bunnell key, or lever as it is sometimes called, was stamped 1881 (most keys are blank and have no identification) and I wanted to find more information about the instrument so I wrote Louise Moreau in Glenolden, Pennsylvania. Louise is considered an authority on matters of this kind. After sending her a picture and information, to my surprise her return letter stated, "date that lovely instrument 1883." By way of informa-

tion, this key was brought out to Arizona by the granddaughter of a collector of railroad memorabilia in the East. I don't think she really was aware of its value.

A few years ago, while driving through Globe, Arizona, a copper mining town, I stopped at a place called the Ghost Mine. It was a kind of a junk shop and museum. The owner had a tremendous collection of old oil lamps that circled the upper shelves of his store.

Looking around, my eyes spotted a brown leatherette box. The dimension of the box was something like the old portable wind-up phonographs. Upon closer inspection, and opening the cover, there was revealed a DeForest F-5 Portable receiver with a folded down speaker in very good repair, except for the dust. At the back of the box was an aluminum spool with about 100 ft. of green silk covered stranded wire for its antenna. On the lip of the speaker was a small white tag with a price of $145.00. The set was never sold, as it had been forgotten about in the basement of the local hardware store, some years prior. This was related to me by the store owner who found it. In the way of trivia, the set, after a good cleaning, won an award in its class at one of the antique radio annual conventions.

It seems other collectors had tried to buy the set previously but without success. I had the good fortune to come in at the right time as the owner was sending his son to medical school and figured he could use the extra money.

I had another adventure while driving in the central part of the state. I was told that an antique shop existed in the little town of Cherry, Arizona. At one time this town of Cherry was a thriving gold mining area, and after driving in what seemed to be a wash or river bed for three or four miles, I arrived at, supposedly, a General Store which I found out had been converted to a modified junk shop. In other words, everything from soup to nuts with only a little antique furniture visible. I don't think this town had more than a dozen people living there.

After rummaging through the store and stopping near the back entranceway, there was this black, slightly slanted panel radio with about half a dozen levers, rather than dials. I had seen similar sets somewhere and most often I would find that the black paint had blistered off the aluminum panels underneath, caused by oxidation. The panels on this set, by comparison, seemed in much better shape. At the bottom, just above the cabinet base, there appeared a small rectangular metal plate which read Michigan Radio Corporation. Remembering I had seen a similar radio in Vintage Radio a while back, identified it as a Michigan Radio Model MRC-12 and because it appeared in an ad of Vintage Radio, it set the date at 1924. What a find.

While my next unearthed set may not strike you as a rare find, it was interesting to me because in the early 30s this radio was sold with the idea that the more tubes it had, the better the set would perform. I am referring to a 16 tube Midwest radio which you could only purchase from the factory at the low price of $57.50 and in small print below, "Less Tubes."

This time the radio was found in Payson, Arizona in a better than average antique junk shop. The chassis and speaker were mint and the cabinet had a few of the usual dings. As a point of interest, the ads for this set mentioned that it was wired with silver wire and adding to the glamour of the ads was that movie stars like Ginger Rogers and Jean Harlow were proud owners, so how could you go wrong?

To conclude, let me say, as collecting goes, when you least expect to find a rare piece, it may be right there for you to uncover.

THE CHIMES YOU HEAR FROM COST TO COAST (A HISTORY OF THE NBC CHIMES)

by Rod Phillips

The *National Broadcasting Company* made its business debut on September 9, 1926 as a corporation owned jointly by *RCA, GE* and *Westinghouse.* Two months later, on November 15 at 8:05pm, NBC began network broadcasting on 24 member stations from the studios of WEAF in New York City. In the months that followed, the rapidly growing number of affiliated stations were experiencing wide-spread confusion at the conclusion of network programs on the hour and half-hour. A coordinating signal was required to alert member stations...a signature which would be a consistent and identifiable cue to precisely synchronize all programming and each station-break.

A team of three men at NBC were instrumental in developing a musical cue to signal station identification on the hour and half-hour; *Oscar Hanson,* a former engineer for *American Telephone and Telegraph,* was destined to become NBC's vice-president in charge of engineering...*Ernest La Prade,* orchestra leader on *The Collier Hour* program, would become NBC's director of musical research... *Phillips Carlin,* one of NBC's announcers, who later became eastern program manager of the network. These three professionals experimented on the air from 1927 to 1928 with a complicated 7-note arrangement of chimes. However, the staff announcers found the seven notes difficult to consistently strike correctly (*G-C-F-E-G-C-E*) and the series was reduced to four (G-C-F-E), then to three. On November 29, 1929 the triad *G-E-C* was first broadcast and soon became the signature known worldwide as the *NBC chimes* at 29:30 and 59:30 past each hour.

The *J.C. Deagan Company* in Chicago made the actual chimes for the network and the stations from their inception until 1954. The company also made 4-note dinner chimes which are now often mistaken for the NBC chimes. The "200 series dinner set" consisted of four note-bars mounted in tonal progression on four resonator tubes. However, the NBC studio chimes had only three note-bars mounted in striking order on a wood resonator-chambered box, padded on the corners with leather bumpers. The authentic NBC chime set had a cast aluminum handle attached to it to enable the announcer to hold the chimes close to the microphone while striking them.

In the interest of timing, pitch and proper sequence, the NBC chimes were automatically sounded from 1932 on, by means of an "electronic musix box." Each note in the triad was composed of eight partial notes in the form of metal reeds, perfectly tuned. These 24 partial note reeds were plucked by fingers on a revolving drum, striking a three-chord chime. Technically each set of parallel metal reeds formed a small condenser, the capacitance of which was varied by the vibrations of the reeds. The notes were amplified and set out over the network, all at the push of a single button.

During World War Two, the famous 4th chime was used to alert the NBC news department of war bulletins. The 4th chime was first heard on the air in 1937 with the report of the crash of the airship Hindenburg; again in 1938 during the Munich crisis; and in 1941 with news of the attack on Pearl Harbor. By the way, the 4th chime was a second strike of the last note "C."

On April 1, 1941 at 1:29pm, the NBC chimes heralded the beginning of NBC television broadcasting and the sign-on of WNBT in New York City. Ten years later, NBC would introduce the visual symbol of the bar & mallet chimes on network television station-

breaks. On color telecasts, the "N" bar was red; the "B" bar was green; and the "C" bar was blue.

A composer named Kurt Maier wrote a musical composition titled "The NBC Polka," a polka adopted from the three notes. The selection was first played on NBC-TV in 1949.

The chimes became a registered trademark and servicemark of NBC in 1950. The three-note sequence was the first audible trademark to be filed with the U.S. Patent Office. It was described in the petition-to-patent: "A sequence of musical chime-like notes which in the key of -C- sound the notes -G-E-C-...the -G- being the one just below middle-C; the -E- the one just above middle-C; the -C- being middle-C, thereby to identify the applicant's broadcasting service."

In 1951, in a musical tribute to NBC's 25th anniversary, Meredith Willson composed "Three Chimes of Silver." Charles Denny, then Executive Vice President, proclaimed the work the network's official silver jubliee song. It was aired again in 1953 during a half-hour salute to the NBC chimes, hosted by Dave Garroway and broadcast by stations on the radio network.

On September 12, 1971, the NBC network discontinued the regular use of the chimes both on radio and television. Then, in celebration of NBC's 50th anniversary, the chimes were once again used following all broadcasts from November 1976 on both radio and television.

★ CARTER
"ONE-WAY" Plug
Takes one head set or loud speaker. Easiest, fastest and simplest plug to connect. Heavy phosphor-bronze springs make positive contact entire length of cord tip. Built up to a high standard not down to a low price.
Any dealer can supply.
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Carter Radio Co.
1806 REPUBLIC BUILDING
CHICAGO

SOME EARLY COLLINS AMATEUR TRANSMITTERS

by John J. Nagle, K4KJ

When one thinks of amateur transmitters today, the name Collins is usually at the top of the list. It wasn't always that way, but, then in another sense it was. Collins always stood for high quality equipment, it's just that Collins was not always as big or as well known a company as it is now.

My principal purpose in this article is to describe a few of the earlier Collins transmitters to help collectors identify and date the various early Collins products. Due to space limitations I will only consider the smaller table-top transmitters, the 30/32 and 45 series, taking the dates from their first announcement in QST.

The first advertisement I can find for Collins in an amateur publication ran in the January 1932 issue of QST.

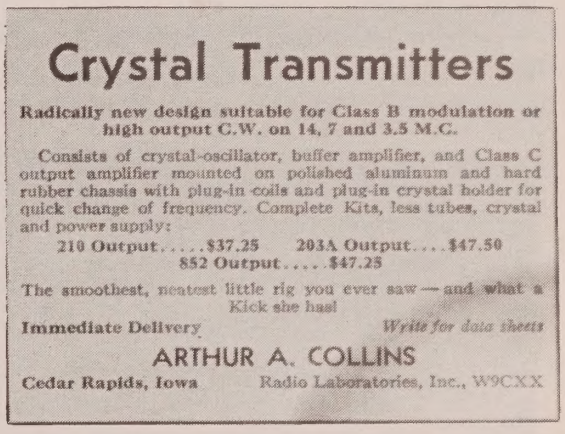

Crystal Transmitters
Radically new design suitable for Class B modulation or high output C.W. on 14, 7 and 3.5 M.C.
Consists of crystal-oscillator, buffer amplifier, and Class C output amplifier mounted on polished aluminum and hard rubber chassis with plug-in coils and plug-in crystal holder for quick change of frequency. Complete Kits, less tubes, crystal and power supply:
210 Output.....$37.25 203A Output....$47.50
852 Output.....$47.25
The smoothest, neatest little rig you ever saw — and what a Kick she has!
Immediate Delivery
Write for data sheets
ARTHUR A. COLLINS
Cedar Rapids, Iowa
Radio Laboratories, Inc., W9CXX

Figure 1 The first Collins advertisement to appear in QST, January 1932.

It's a measly little two-inch ad in the lower right-hand corner of the page announcing that one Arthur A. Collins, W9CXX, of Cedar Rapids, Iowa could provide a stable, crystal-controlled transmitter of radically new design suitable for class-B modulation.

Beginning with the May 1932 issue of QST, Collins started advertising production transmitters. The first was a 150-watt phone transmitter, class-B modulated. This later became known

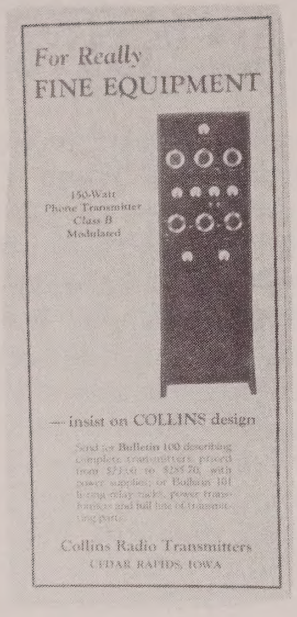
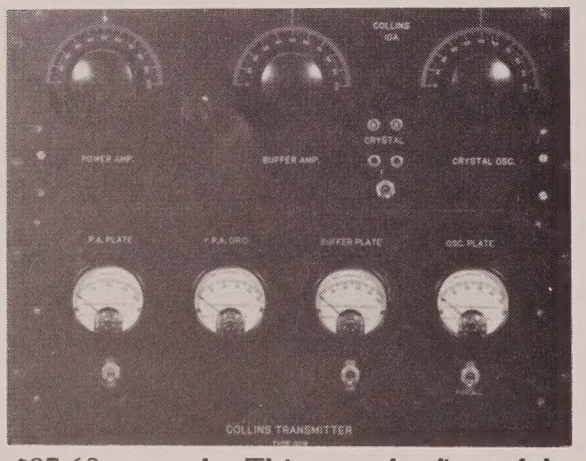


Figure 2 The May 1932 issue of QST printed the first advertisement that I have been able to find for a Collins production transmitter, a 150-watt unit. Picture credit John J. Nagle.

as the 150A and 150B; the A model was cw only while the B model was phone or cw.

In July 1932 Collins announced a 30-watt (output power) table-mounted transmitter, the type 30W; price



$95.60, cw only. This was the first of the long popular 30/32 series. The ever popular single side-band version, 32S, was in production for approximately 20 years and set the pattern for the current trend in single side-band equipment.

The October 1932 QST introduced the 40B transmitter for $235.00, an accessory 90C audio amplifier for $32.00 and a 5A condenser microphone for $125.00. No wonder cw was

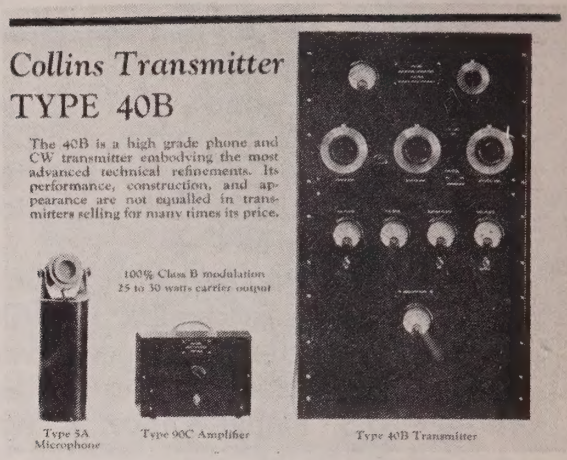

Collins Transmitter
TYPE 40B
The 40B is a high grade phone and CW transmitter embodying the most advanced technical refinements. Its performance, construction, and appearance are not equalled in transmitters selling for many times its price.
100% Class B modulation
25 to 30 watts carrier output
Type 5A Microphone
Type 90C Amplifier
Type 40B Transmitter

Figure 4 The 40B which was announced in QST, October 1932. Picture credit John J. Nagle.

so popular in those days! The rf section was identical with that of the 30W, previously announced.

This issue of QST was another first for Collins; the Collins advertisement moved from the back of the magazine to the more prestigious front advertising section. Two years later in the October 1934 issue, Collins moved to the even more prestigious inside front cover.

In April 1933 two new models were announced, the 32A and 32B. They were cw and phone versions, respectively. These rigs were rated at 20–25 watts output, used three stages (of rf), were crystal-controlled and had dual power supplies. The 32A appeared to be very similar to the

The—
32A and 32B
COLLINS TRANSMITTERS . . .
. . . announced in the April issue of QST have been writing a brilliant page in Amateur Radio history. Never before has a complete, self-contained, 20-watt CW or radiophone transmitter been built in such compact and efficient form, and never before has anything approaching these transmitters in performance been offered at anywhere near their price.

Figure 5 QST for April 1933 showed the 32A/32B transmitters for phone and CW, respectively. Picture credit John J. Nagle.

30W, As very few technical specifications were given, it's hard to tell exactly.

Two small but significant changes occurred in January 1934; Collins began advertising as the Collins Radio Company instead of Arthur A. Collins, and the winged emblem made its first appearance.

Collins announced a new transmitter in December 1933; this was the 4A which was intended to be a low-cost, low-power transmitter.

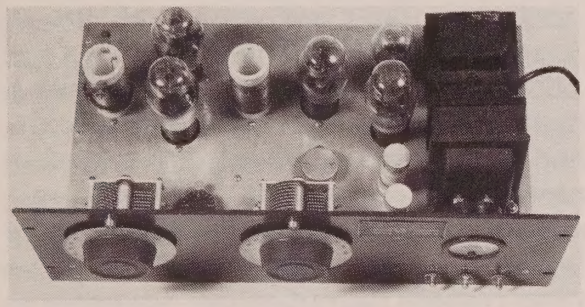


Figure 6 The low-cost, CW-only transmitter, 4A, was announced in December 1933. Picture credit Collins Radio Division, Rockwell International.

Collins advertisements for most of 1935 dealt with the 30FX, 30FXB and the 150C for "deluxe amateur installations" and several commercial items, all of which are beyond the scope of this article. In October 1935 Collins produced the table-top 45A with 45 watts output on phone and 125 watts on cw; weight 125 pounds—not a light weight! The rf output tube was a 211D.

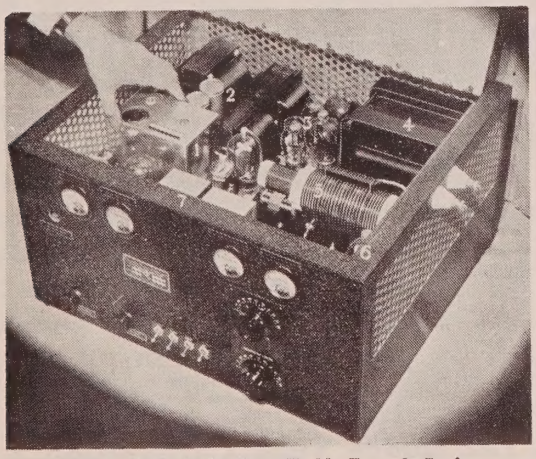


Figure 7 A table-top model, the 45A was first advertised in October 1935 QST. Picture credit John J. Nagle.

Collins Radio apparently spent calendar year 1935 consolidating its position as a supplier of amateur equipment. No "low-cost" amateur transmitters were introduced but several higher power units for deluxe amateur installations and several commercial equipments were announced.

In March 1937 the first version of the 32G came along. Unfortunately,

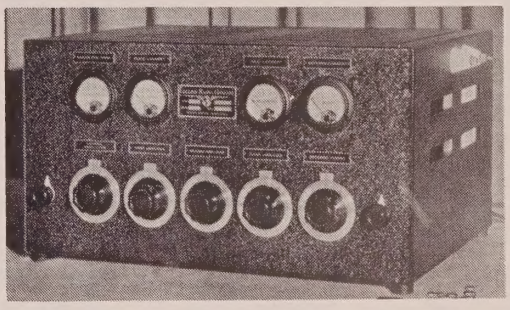


Figure 8 This was the first version of the 32G, from QST in October 1936. Picture credit John J. Nagle.

there were three variations of the 32G and this is going to cause confusion among collectors. The original version was similar in appearance to the 45A but had five large tuning knobs under the meters. The second version

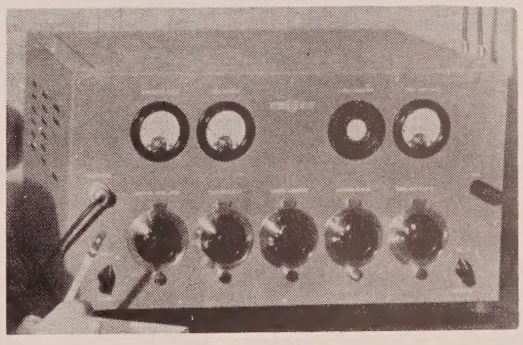


Figure 9 The second version of the 32G used a 1-inch CRT for a modulation monitor, as shown in QST, October 1937.

appeared in March 1937; the styling was updated to the then current style. One new wrinkle was a built-in 913 one-inch cathode-ray tube for modulation monitoring. The principal change in the final version was a return to a conventional meter to monitor the modulation level. This version came out in December 1938.

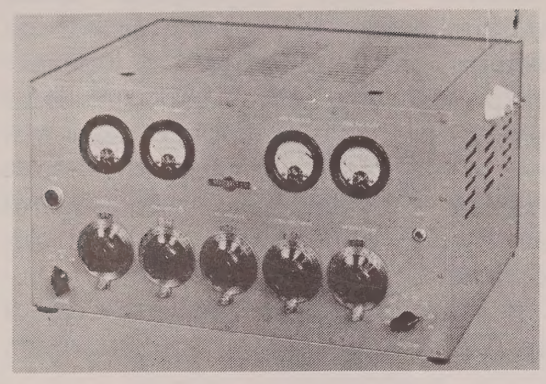


Figure 10 The final model (I think) of the 32G kept the same styling as the October 1937 model but went back to a meter as an audio level indicator. Circa December 1938. Picture credit John J. Nagle.

The last transmitter I am going to mention is the 32RA which was introduced in May 1938. This transmitter was apparently intended for either amateur or commercial use.

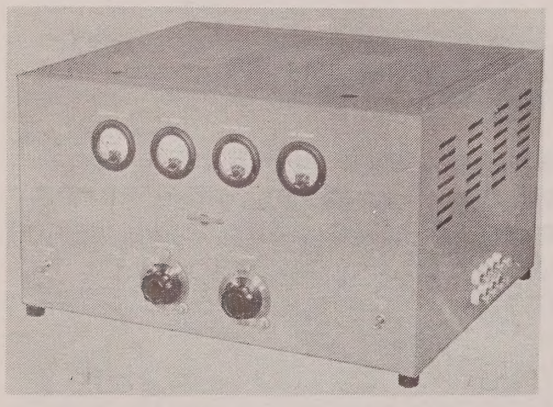


Figure 11 The 32RA was apparently intended for use by non-technically trained personnel. Picture credit by John J. Nagle.

Only two front panel controls were used. It could be preset to any four fixed frequencies in the 1.5 to 15 mHz range. There were four sets of antenna terminals so that a separate antenna could be used for each frequency, or a single antenna could be used for a group of frequencies.

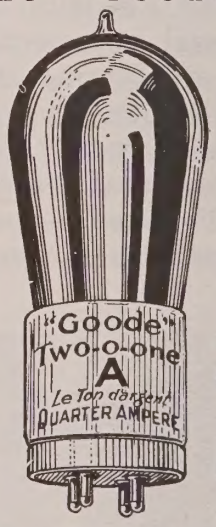
Beginning about this time war clouds were gathering over Europe and companies like Collins were beginning to concentrate more and more on military products. Collins' next contributions to the advancement of amateur radio came after WWII with the introduction of the permeability tuned oscillator (PTO) and the mechanical filter. The permeability tuned oscillator gave a linear frequency scale and was used on the 75A receiver and the 32V transmitter. Later Collins perfected the mechanical filter which improved the selectivity of amateur receivers and was also effectively used in the S-line of single side-band equipment, which set the standard for amateur SSB equipment. But this is another story.

Acknowledgments

I would like to acknowledge, with thanks, the help of Dave Berner of the Collins Radio Division of Rockwell International for his efforts in obtaining the photographs credited to Collins. The remaining photographs were copied from Collins advertisements in QST or from Collins catalogs. As usual, my thanks to my wife, Martha, for her editorial help.

The "Goode" Two-o-One

Guaranteed



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Postpaid

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The "Goode" Two-o-One A Tube amplifies or detects. It is a quarter ampere, six volts, Standard base silvered tube.
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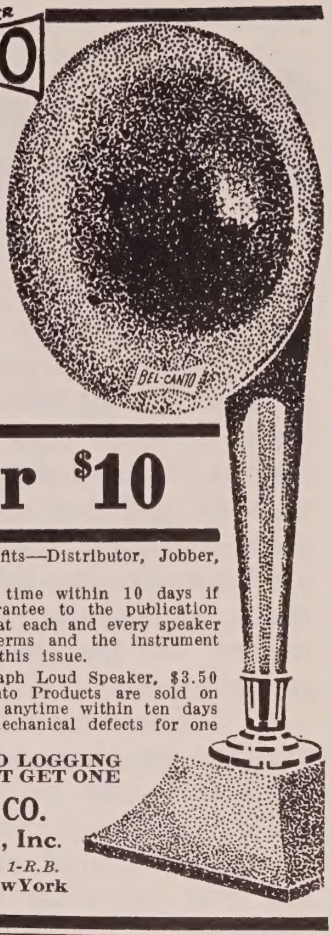
NEWS FROM CHARLESTON
by W. Blaine Smith

While it has been our goal in the past to keep the reader abreast of what's going on with our local chapter, we'd like to vary from the norm this issue and express a few thoughts incurred while reflecting on the 15th anniversary of ARCA and the past several years of our involvement with this organization.

From a humble meeting of just 3 people in September 1980, our club has grown to a solid base of approximately 25 members with another 20 non-members on our active mailing list. The figures here may not be overwhelming. However, the seemingly tireless effort of many of our members and the enjoyment of club association involving a hobby you admire and respect have really left me with the impression that this organization will be around a long time. We've met many new friends along the way (both locally and nationally) who share our interests and objectives—friendships made possible because of the common denominator we know as "radio." It's easy to get wrapped up in the activities and events of one's own local chapter and it's often hard to see past the locals, except for the yearly meet. But it is encouraging to know that there are more individuals and local chapters out there doing their part to "preserve the history of the development of wireless communication."

The entire Charleston Chapter is very proud to be a part of the Antique Radio Club of America and would like to extend our congratulations for reaching the 15 year milestone and thanks for making our hobby all the while enjoyable. Here's hoping the next fifteen years will be as rewarding as the past fifteen years.

THE ACOUSTICAL AMPLIFIER
BEL-CANTO
TRADE MARK



This Famous Loud Speaker

$10 DELIVERED FREE TO YOUR DOOR

You cannot buy the Bel-Canto through any dealer, only direct from us.

$25 for $10

We save you these three profits—Distributor, Jobber, and Dealer.

Guarantee:—Money back any time within 10 days if dissatisfied. We further guarantee to the publication carrying this advertisement that each and every speaker will be sold on the above terms and the instrument will be exactly as offered in this issue.

Bel-Canto Adjustable Phonograph Loud Speaker, $3.50 Delivered Free. All Bel-Canto Products are sold on Guarantee Money Back Basis anytime within ten days and are guaranteed against mechanical defects for one year.

SENT FREE:—RADIO LOGGING CHART GET ONE

BEL-CANTO MFG. CO.
BENSEL-BONIS CO., Inc.
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Crescent Lavite Resistances Absolutely Non-Inductive

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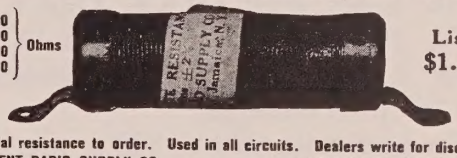
48,000
50,000
100,000
Ohms



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By Lieut. Victor Greiff, E. E., Member I. R. E.

Is success insurance in planning any Super-Heterodyne Set. Detailed information with blue print. **$1.50**

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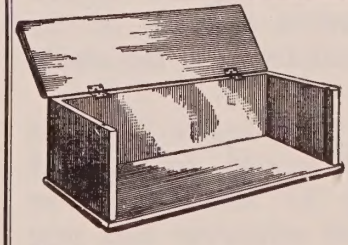


Neat-Fit Radio Cabinet
for your home-built set
Sent direct, parcel post prepaid

Here is a cabinet of clear Oregon Fir, knocked down, easily assembled, grooved for panel, with hinged lid supported by bracket. Sent unfinished to be stained or painted to suit your individual taste.

7x7x16..... $2.00 7x7x26..... $2.40
7x7x21..... 2.20 7x7x28..... 2.50

EXPRESS BODY CORPORATION Crystal Lake, Illinois
Radio Dealers write us for inviting proposition open now

Old-timer's Notebook

James A. Fred © 1986 J. Fred –

Dear Old Timer: I would like to be able to demonstrate some of my old battery radios to prospective buyers at radio flea markets and ham fests. I know I could buy an inverter to change the car battery voltage to 115 volts AC and then use a battery eliminator to supply the voltages needed for the radio, but this seems like too much equipment and too much money. Do you have a better suggestion?

A. I have been thinking about this problem for some time. I have some ideas that may help you and other collectors with this problem.

First we should analyze the problem and see what voltages will be needed.

1. For a set with O1A's, 112A's, or 71A's, you will need 5 volts DC at about 2 amperes, for the filaments, plus "B" plus voltages.
2. For a set with 99's or 120's, you will need 3.3 volts DC, for the filaments, plus "B" plus voltages.
3. For a set with WD11's or WX12's, you will need 1.1 volts DC, for the filaments, plus "B" plus voltages.
4. You may need "B" plus voltages of 22 1/2, 45, 67 1/2, and 90 volts DC. I never recommend using 135 or 180 volts on old radios because of the possibility of breakdown in the audio transformers.
5. Some radios will require "C" bias voltages, too. I would recommend connecting some "D" size batteries in series and tap off whatever bias you need.

By using Zener Diodes, we can divide the car battery voltage down and get the filament voltages we need. Rather than turning this column into a lesson on the theory of a Zener diode, we will just show the suggested circuit that will allow you to do this. First we will decide that 2 amperes will be enough filament current to power most battery sets. Refer to Figure 1. This is the basic

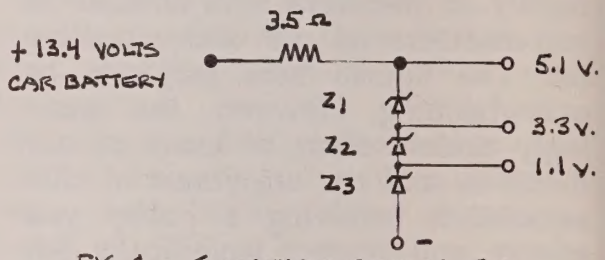


FIG. 1 SUGGESTED CIRCUIT FOR FILAMENT VOLTAGES

circuit that will supply the three filament voltages we need. Z1, Z2, and Z3 are connected in series: we only need 5 volts and the battery provides a nominal 13.4 volts. This means that we have an excess of 8.4 volts. By using a series resistor R1, we can absorb the excess. The load on the battery will be 2 amperes plus 10% extra for the Zener diodes. So, by Ohms law, we find that R1 should be 3.7 ohms 18 watts. More easily obtained values would be 3.5 ohms at 20 watts. It would be best to connect a large electrolytic capacitor across the battery to minimize electrical noise. A 5,000 to 10,000 mfd., 25 volt capacitor will do just fine. Small capacitors can be shunted across each Zener diode to minimize RF noise.

There are two easy methods you can use to obtain the "B" plus voltages. One is to remove the high voltage supply from a 12 volt car radio. The other is to buy a World War II surplus power supply. The supply we used was purchased from

Fair Radio Sales Co., Lima, Ohio. This particular power supply has a catalog number of PP868 and is priced at $5.95 plus shipping. You couldn't build one for this price. This supply has output voltages of +195, –50, and +5 volts. It uses a vibrator and draws less than 2 amperes at full load. By using the circuit shown in Figure 2, you can obtain the "B" plus voltages you need.

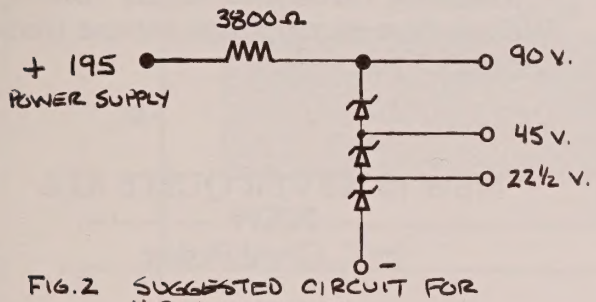


FIG. 2 SUGGESTED CIRCUIT FOR "B+" VOLTAGES

If you use the power supply from an old car radio, you will still need to divide the 250 volt output down to the required voltages. Zener diodes will again do the job.

If you need more help with putting these ideas into practice, feel free to write me with your problem.

Q. In looking at the schematic drawings of AK and other pre-1930's radios, I see capacitor values like .5, 1, and 2 mfd. at 600 volts DC. The present day radio parts catalogs, i.e., Radio Shack for instance, only list high capacity, low voltage electrolytic capacitors. Where do I get the proper value capacitors for my old radios?

A. There are a few companies that still supply high voltage replacement capacitors. One of these companies is: Vintage TV and Radio, 1204 Andrews Ave., Lakewood, Ohio 44107. If you send a SASE and request their capacitor list, you will find most any size you may need. Another source of supply for capicators you can use in the old radios is Fair Radio Sales Co. at the address listed above. This company has an assortment of paper dielectric, oil filled, metal cased capacitors. Even though some date back to World War II, they were made of premium grade materials, and hermitically sealed. They will be as good today as the day they were manufactured.

You should never increase the value of a filter capacitor much beyond the value originally used by the set manufacturer. There are several reasons for this rule. The charging current initially drawn by the first filter, when the set is turned on, can destroy the rectifier tube or power transformer. Modern day sets with 20, 30, 40, and 80 mfd. capacitors are designed for these values.

Capacitors of equal voltage rating may be placed in parallel, see drawing, to increase total capacity.

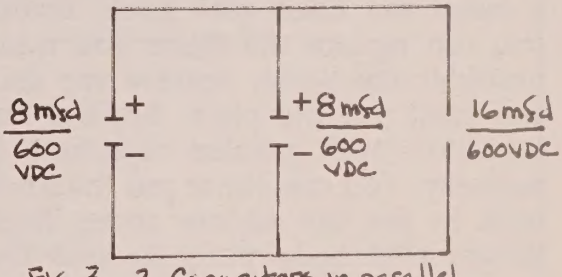


FIG 3 2 Capacitors in parallel

Capacitors of equal voltage rating may be placed in series to increase total breakdown voltage, but it reduces the total overall capacity. In other words, two 8 mfd., 600 VDC capacitors placed in parallel would

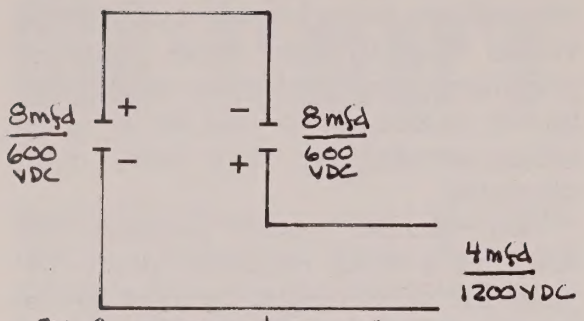


FIG. 4 2 Capacitors in Series

equal 16 mfd. at 600 VDC. Two 8 mfd. capacitors placed in series would equal 4 mfd. at 1200 VDC.

We can use the above bit of electronic theory to use various sizes of capacitors to provide many values. For instance, if you needed 1.5 mfd at 600 VDC, you could use three .5 tubular, paper dielectric capacitors in parallel. When using present day capacitors, the total physical size may be smaller than the original and easily fit the mounting space.

The AK metal box sets from model 37 to 48 have the capacitors sealed in a metal can filled with pitch. Before you can replace the filters you must unsolder the wires, remove the can, and melt out the pitch. Replace the capacitors with parallel capacitors if necessay. You can either put the pitch back in the can or use some Black Knight auto body putty to hold the capacitors in place. After the set is reassembled, your friends won't know the difference.

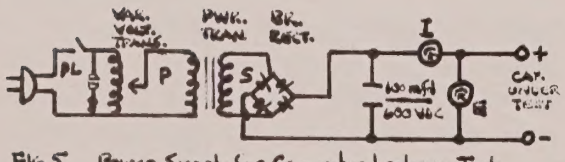


Fig 5. Power Supply for Capacitor Leakage Test

It is wise to check all capacitors for leakage current. A variable voltage power supply can be connected as shown. If the millimeter reads any current at all, the capacitor should never be used. It is wise to check every capacitor in an old radio for leakage before considering it as being restored.

Keep the cards and letters coming. We are here to help you restore those old radios you collect.

NEW IS NEVER QUITE ALL NEW

by C. Orval Parker

PRIOR ART: (is this actually new?) is a term that has appeared in electronic history many times. So when solid state developments are under discussion it should be noted that a solid state triode (transistor) radio was invented in 1925 and it was Field Effect Technology (F.E.T.) as well. According to an article reviewing semiconductor history by Ann Murphy in the February 15, 1979 CIRCUIT NEWS, in 1925, Dr. Julius E. Lilienfeld of Brooklyn, N.Y. constructed radio receivers incorporating what he termed a "method and apparatus for controlling electric currents" for which he applied for a Canadian patent in October 1925. On October 8, 1926, an application for a U.S. patent was made by that title for a radio receiver design incorporating (control) elements which, by analysis in 1964, had the basic characteristics and functioned as what is named "transistor" and closely acting as Field Effect Technology.

The U.S. patent (No. 1, 745,175) was granted January 28, 1930 and other patents in the same development area in 1932 and 1935 were granted to Dr. Lilienfeld. Dr. Lilienfeld was of Polish birth and had been a professor

Jan. 28, 1930. J. E. LILIENFELD 1,745,175

METHOD AND APPARATUS FOR CONTROLLING ELECTRIC CURRENTS

Filed Oct. 8, 1926

Fig. 1.

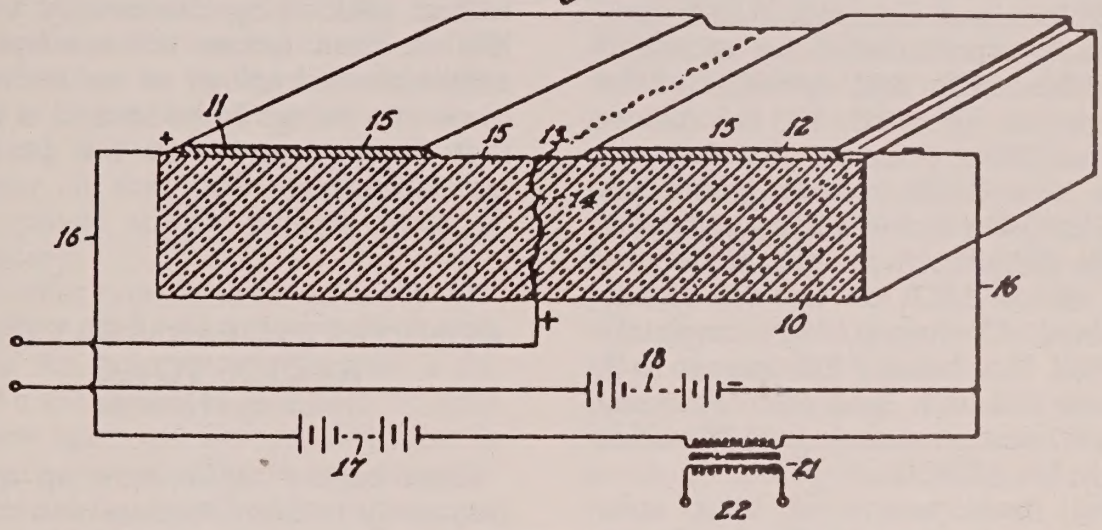


Fig. 2.

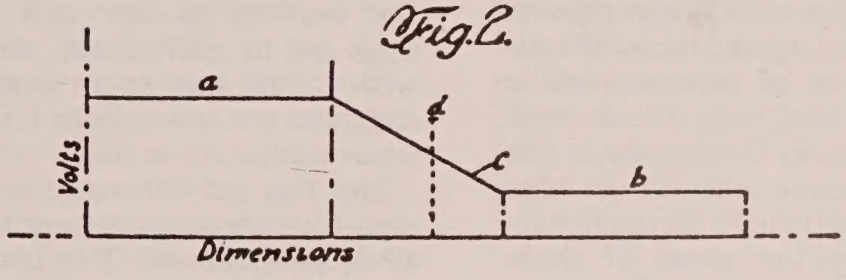
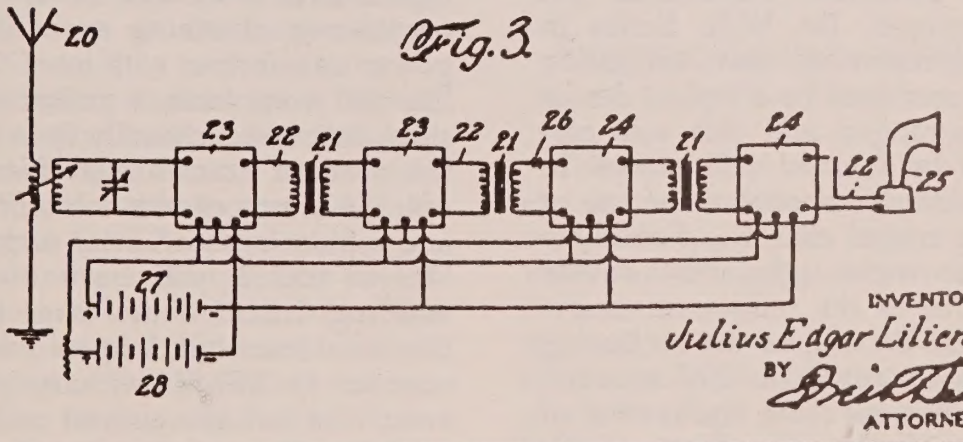


Fig. 3.



INVENTOR
Julius Edgar Lilienfeld
BY Brick Schmidt
ATTORNEY

of physics at the University of Leipzig, Germany; assisted in the development of the Zeppelin airship. In the U.S. in the early 1920s he was known to have developed Roentgen radiation applications. He became a U.S. citizen in 1935 and died in 1963.

In the 1920/1930 era the meager development and dissemination of quantum mechanics principles precluded the inclusion of language by Dr. Lilienfeld in the patent application to ad-

equately define the conductivity modulation by minority carrier injection in semiconductive surface layers. This communication barrier perhaps explains the over four-year delay in granting the patent in an era when the most usual processing time was a few weeks.

The lack of adequate controls of conditions and materials at that time probably contributed to the uncertainty of fabrication and operation of the device as specified in the patent claims. Other prior art that is pertinent is a British patent granted in 1935 to Osker Heil of Germany wherein the definition was such that operation as an F.E.T. device was clearly outlined. Of course, the completely defined U.S. basic F.E.T. patent to J. Torkel Walmark was filed February 28, 1957 and granted August 18 as U.S. Patent No. 2,900,531.

The development of solid state technology began with Braun observing the unilateral conductance of certain combinations of certain metallic substances in 1874, and the investigations by Pickard, Dunwoody in the U.S.A., and others abroad. In this period, some individuals certainly harbored the suspicion some of these materials possessed capabilities yet to be explored. Dr. W.H. Eccles in 1910 demonstrated that oscillation could be produced by a crystal device suitably arranged and this was corroborated by Pickard and others. In 1915 Pickard demonstrated the use of oscillating crystal circuit to hetrodyne continuous wave signals to provide tone output to the telephone receivers. He also developed the oscillating crystal as an autodyne CW receiver. And last, but not least, the revival of this technology by Dr. Esaki as the "Tunnel Diode", and later the "hot diode" technology by others.

But two element solid state technology has never produced an amplifier (i.e., an energy gain device), but has produced much in effective applications. So when Bell scientists with the understanding of the quantum mechanics involved developed the "Transistor," it was essential that it be an amplifier. While it is evident that Dr. Lilienfeld was informed in the state of quantum mechanics, this science had not stabilized and the world about him was not able to apply the development based on such radical philosophy. So, twenty years had to pass before the concept of solid state technology as we know it, came into being. To be sure, it is true that "new" today may not be just quite all new.

CONVERTING FARM BATTERY RADIOS TO AC

by George Hausske

Farm battery radios turn up quite frequently in farm auctions and rural flea markets at low cost. Many of these are in good shape, so you may wish to use one as an everyday set, and here are some ideas for changing the power source to AC.

The first set I'll mention is a four tube 6 volt storage battery set, Zenith 4V-31 in Riders #6. This is the easiest type to alter to AC and the first item to consider is obtaining a small 6 volt power transformer with low DC ouput like 180 volts from a junker set possibly, that will physically fit in place of the vibrator transformer. Next, drill out the rivets of the vibrator socket and replace with an octal socket for a 5Y3 or 6X5 if you have no 5 volt winding. Install a line cord through the now discarded battery wires and connect to XFMR primary via line switch on volume control and add a .01 600 volt condenser from one side of line to ground. After connecting high voltage leads of XFMR to plates of 5Y3, connect one side of filament to filter choke at the point the vibrator XFMR center tap is connected. Ground center tap of H.V. winding and be sure to check or replace filter

condensers before turning on the power.

Next, connect all tube heaters in parallel across the XFMR 6V. winding. (The type 15 tubes originally used here are in series with a resistor which can be discarded along with filament R.F. choke.)

Now insert a type 36 tube in the DET-OSC socket and a 39/44 in the I.F. socket while leaving the 75 and 38 output tubes as is. No other changes need to be made and the set will work perfectly if it worked originally. Add a resistor in the filter circuit to keep D.C. power supply voltage down, if necessary.

Another type of form set is the Air-Cell/Dry Cell set using 1 1/2 volt tubes. An example of this type is the Zenith 4F133 shown in Riders Volume 8. Here again our first consideration is to find a very small power transformer as this set has no vibrator fransformer to replace. Here, I was lucky to get our "Old Timers Notebook" writer, Jim Fred, to supply me with a Stancor PS-8416 XFMR with high voltage winding of 125 V. each side of the center tap, and 6 volts of heater power of 1 amp. Drill out the rivets of the resistor socket used and install the transformer over it, and alter the battery cable socket to an octal type for a rectifier.

Tube selection in this case is critical as only 1 amp of heater power is available, so our tube choices are as follows: 1C7 mixer changed to 6D8; 1D5 I.F. changed to 6S7; 1F7 dectector to 6T7; power output 1F6 changed to 6G6 and a gaseous rectifier of 0Z4. The four tubes plus pilot light draw a total of .75 amps and with low plate voltage of 135 or so, we are within the 25 m.a. limit of the transformer. The tubes selected all have one additional element to connect; namely the cathode. The 6G6 power tube required cathode grounding with a 600 ohm resistor and 10 MFD by-pass condenser. All the other three required direct grounds. Luckily, the cathode lugs were available with minor adjustments, for the ground connections.

After rerouting the speaker leads through the hole under the power transformer, the line cord is run through the vacated grommet and connected to the transformer primary via the switch on the volume control, after removing all other wires. Run the 6 volt heater wires direct from XFMR to all tubes except the 0Z4 rectifier. (Note that one side is grounded.) Next the DC supply is completed by connecting high voltage XFMR wires to 0Z4 anodes and connecting a 2000 ohm 20 watt resistor from 0Z4 cathode to the B+ line feeding all tubes. An 8 to 10 MFD 250 volt electrolytic is required from each side of resistor to ground. When power is turned on, the set should work very well with only minor or no touch-up of alignment. Other rectifier tubes could have been used if the transformer were suitable.

A Philco 38 has been altered similar to the above with excellent results. These are typical ways to electrify farm sets and I'll be glad to correspond with anyone attempting similar reworking.

MECHANICAL TELEVISION

by Peter Yanczer

Television first came into the public eye in the middle to late 1920's and early 1930's. In the beginning, television was a novelty and provided very little information or entertainment value as we know them today. In spite of this, television became very popular. It's been estimated that over 500,000 receivers were built or bought during the "first" television boom. Receivers for the home provided pictures with 24 and later, 48 or 60 lines, one to three inches square and reddish or orange in color. When sound was provided, it was inserted between periods of picture transmis-

sion or simulcast on another frequency.

Many of the receivers were constructed by experimenters. Some built kits and others worked from information printed in various technical magazines of the time. Quite often, they would use motors from old fans or appliances, which provided no means for synchronization. Only by careful and continuous adjustment of a rheostat or brake, could synchronism be achieved and then never for more than a "blink of an eye." With these crude receivers, reception of any form of recognizable image was a tremendous accomplishment. Many times, people wrote in to the station, just to say that they saw an image.

The receivers were extremely simple. The major parts were the scanning disk, motor, television neon lamp and a means to vary the speed of the motor or disk. The lamp was connected to the output of an associated radio receiver or a special three or four tube television amplifier, connected to the receiver. Options included a magnifying lens and cabinet.

The standard formats were 24 lines, 7.5 pictures per second, (yes, the flicker was terrible) 48 lines, 15 pictures per second and 60 lines, 20 pictures per second. In the Chicago area, one of the stations used the Sanabria standard of 45 lines, 15 pictures per second with each picture made up of three interlaced fields of 15 lines each. The most well known commerical receiver using this format was the "Western" brand.

To illustrate the kind of picture that was available with the 48 line system, take a piece of cardboard or opaque paper, approximately 8" by 11" and cut a 1.5" square opening in the center of it. Place this on any part of the face of the CRT on your 25" color set and what you see in the opening is approximately what you would see on a mechanical system. An even closer approximation can be had by placing some sort of red filter over the opening, or if you are familiar with color sets, turn up the red gun.

Mechanical television receivers are just as easy to build today as they were 60 years ago. For the constructor, the hobby has a unique set of requirements in the form of model engineering, electronics and optics. For those who are interested, the necessary information is readily available.

However, there is a problem if you want the receiver to actually operate since there are no transmitters sending out the appropriate television signals. Therefore, it is necessary to develop your own television signal. This is not as difficult as it may seem because a mechanical television camera is not very different from a receiver. In fact, there are ways to use the same disk and motor for both the camera and the receiver. This technique can also be used to provide a video monitor function at the camera location.

If you are a tape enthusiast, it is possible to tape record the signals on reel to reel or modified cassette tape machines. This has been most successful with systems operating on the 24 or 32 line standards. Stereo recorders offer the possibility of using the second track to provide synchronized sound to accompany the picture. A number of experimenters are sending tapes back and forth through the mails, exchanging messages and images.

Ham radio operators can also transmit and receive these television signals. It offers the chance of entering the field of ham TV at minimum expense. Bandwidth requirements are modest, being about 3 times (24 lines format) or 6 times (48 line format), the bandwidth required by a voice channel. Standard techniques can be used to reduce these values by one half. For those who have no interest in recording or transmission, there is the option of closed circuit operation by which the signals are

sent along a wire to the receiver. Because of the unrestricted bandwidth, the images can be of superior quality.

Radio collectors with displays of equipmnet in their homes, can enhance their demonstrations dramatically by adding an operating mechanical receiver to the display. Due to the rarity and cost of actual vintage television equipment, it is not practical or possible for the average collector to acquire a set for his collection. What the collector can do is to construct the equipment much like the experiemnter did in the early years. He can fabricate or purchase the parts as he sees fit and the completed set can have all qualities and appearance of vintage equipment. This is particularly true if a period style cabinet is used.

Additional information on this interesting facet of our hobby is available in the following books:

"The Mechanics of Television" by Peter Yanczer (1987)

"Taylorvision" by Edmund E. Taylor (1984)

THE FIRST DOZEN RADIO SPEAKER MANUFACTURERS

by Floyd A. Paul

A review of early Radio News magazines and Radio magazines in 1921 and early 1922 indicates the first dozen radio speaker manufacturers to advertise were:

Arnold, J.F.
Boissonault, G., Co.
Firth, John and Co.
Federal Tele. & Tele. Co.
King
Magnavox Co.
Phonetron
Radio Service and Mfg. Co.
Rhamstine, J. Thos.
Riley-Klotz Co.
Telephone Maint. Co.
Westinghouse Elect. & Mfg. Co.

J.F. Arnold was a very early horn manufacturer and made a horn device before WWI. In Feb. of 1922, Arnold advertised a small bell (3" dia.) on a short straight neck instrument mounted in a wood base. The price was $15.00

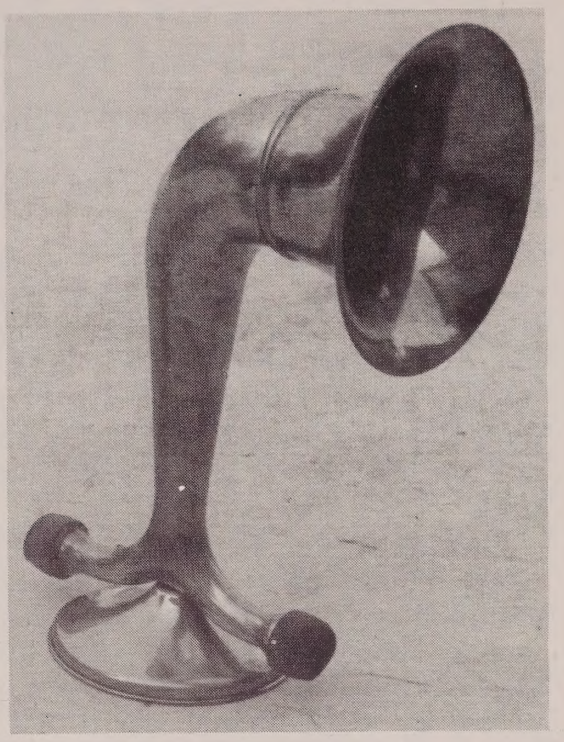
G. Boissonault Co. made a small twelve-inch high straight neck horn speaker. The first advertisement appeared in Sept. of 1921. They sold a model 50 and a model 60. The company did very limited advertising and not much is known about their products.

John Firth and Co. used the trade name Firco and advertised considerably in late 1921. He sold an experimental type horn speaker (the horn was mounted on a vertical rod supported by a base metal stand) and a station type style which was mounted in a cabinet. ($30.00) Firth used Baldwin "C" drivers. The station type horn was sold by a number of retailers who advertised the Vocaloud rather extensively.

Federal Telephone and Telegraph Co. announced a Pleiophone No. 400-W at $14.00 in Sept. of 1921. It was a short straight neck horn speaker. This company also did little advertising of their horn speaker product.

King announced the "Am-pli-tone" for $12.00 in Mar. of 1922. The company offered one style, a cast polished aluminum body and nickel plated base and bell. It required a headset (pair of earphones) clamped onto two rubber grommets. The air columns merged into one at the base. The bell was 7" in dia. and the horn was 14" high. This horn has become one of the highly sought after early horns. It has a very pleasing shape and appearance.

The Magnavox Co. which had made horn speakers from the mid-teen years was in the radio market place by mid 1920 with a 6" dia. bell horn speaker, model R1 and a 22" dia. bell horn, R2-A. The R3-A and R3-B were being marketed in 1921. The R3-B



(early) 1921 was a straight neck, smooth black paint with a 14" dia. bell and was followed in 1922 by the R3-B (late) goose neck, wrinkle paint with a 14" dia. bell. Maganvox drivers used electro-dynamic driving voice coil units. In 1922 Magnavox brought out an R2 with an 18" dia. bell. (A Collector's Guide to Magnavox Horn Speakers, Dec. 1980, OTB.)

In 1921 Continental Radio and Electric Corp. sold a unique speaker for its time called the Phonetron. It was a cone speaker and was advertised as a sound converter, (electrical energy to sound or sound to electrical energy). It had a dynamic field coil and with a six-volt storage battery connected to it, the field consumed 2 1/2 amps which was a very heavy current drain. (The Magnavox field coils, in comparison, drew one ampere or less.) It was advertised at $45.00.

Radio Service and Mfg. Co. first advertised a horn speaker in Dec. of 1921. It was called the Amplitron. It used a Baldwin Type "C" earphone mounted onto a small megaphone chamber pointed into a large concave cone reflector. It could be called a reentrant horn speaker. The speaker less the driver was priced at $10.00 and with a Baldwin "C" driver sold for $16.25.

J. Thos. Rhamstine advertised an "Adapt-O-Phone" in Feb. of 1922. It used a pair of earphones (headset) clamped onto the two small air column posts at the base of the horn. The air column merged at the center of gravity at the base and rose vertically to a smal bell opening at the top of the horn, 20" high. The wood base, the casted manifold and Japan black painted neck gave this horn a distinctive shape. The horn sold for $12.00 less any driver. Soft rubber sleeves on the air column posts protected the earphones from getting scratched.

Riley-Klotz Mfg. Co. brought out the "Arkay" loud speaker in Feb. of 1922 for $5.00 as a black enameled finish or full nickel for $6.00. The base

looks like an old fashion oil can. The neck does a full circle and the small bell opening is turned at right angles.

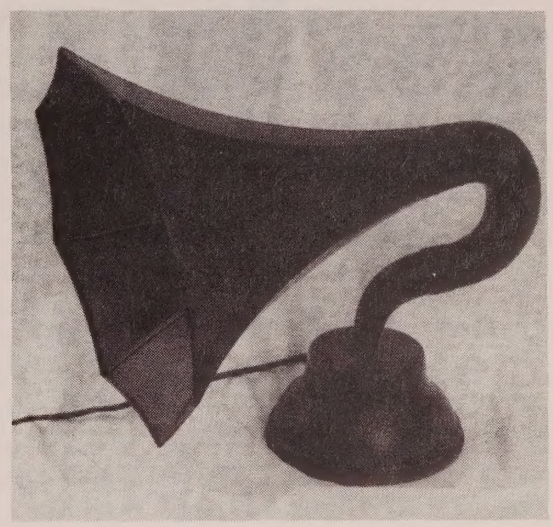
Telephone Maintenance Co. in Mar. of 1922 announced the Telmacophone. The company offered the

Baldwin "C" driver unit and horn for $20.00. The horn used the reentrant shape and seemed to have an exponential shape to its outer bell. The small C shape neck support and webbed shape foot base made the unit pleasing in appearance.

In early 1922 Westinghouse Elect. and Mfg. Co. announced the "Vocarola" (See ARCA Summer of 1983 for article on this horn). The cost

was $30.00 and it was shown with the RC receiver made by Westinghouse. (See OTB, Mar. 86 for more history about the Vocarola and where it came from.) The horn was advertised very little and if the reader missed reading the Feb. 1922 issues of Radio News and Radio he probably missed seeing the ad for the Vocarola.

The First Dozen Radio Speaker Manufacturers article cannot be completed without reference to Western Electric (W.E.). The company had been in the speaker design business since 1907, but W.E. did not advertise in early radio magazines. W.E. sold directly to dealers, wholesalers and merchandising outlets but did little advertising through public-oriented magazines. The company had a number of horns on the marketplace early in the 1920s. (See article on W.E. in June 1981 OTB.)



Some other companies to advertise radio horn speakers in late Spring of 1922 were:

Standard Metal Mfg. Co.
Sohn and Co.
Radio Electric Co.
American Radio Equip. Co.
Ryan Radio Co.
Radio Appliance Co.

In summary, it is interesting to note that of the first dozen manufacturers, one was a cone speaker manufacturer, while the rest made horn speakers. Whether the exclusive distribution through one company hurt the sales, whether the price was too high or whether a patent infringement (possible with Magnavox) caused the product's demise is not known. Also note in the first dozen manufacturers, the Baldwin "C" earphone was standard equipment for four of the manufacturers and was undoubtedly made available from some of the others. (See Baldwin Earphones, Dec. 83 OTB.)

Ye Old SWAP SHOP

All ads and Swap Shop items are printed in the Gazette free of charge. We do ask that you write your ad on a separate sheet of paper, type if possible, or print, and be sure to include your name and address. We reserve the right to edit all ads. ARCA is not responsible for any transactions, of course.

WANTED: Antique KDKA microphone for display in studio lobby. Purchase or loan. Must be authentic. Contact: Seth Ward, 83 Ruthfred Dr., Pgh., PA 15241 412-835-6603

WANTED: Knob for Super VIII Zenith 1924. One inch diameter with pointer and one quarter inch threaded shaft. Jim Barrows W7BCT, 15121 41st Ave., S.E., Bothell, WA 98012 206-337-4880

WANTED: Two good audio transformers for sub panel mount on old set I am fixing. I am a *Senior—Senior* Citizen of many years. Hugo Castelli, 1406 East 5th Ave., Joliet, IL 60433

WANTED: Early-rare Hallicrafters receivers and literature. Also transmitters—anything unusual pertaining to this company needed for a potential museum. Max De Henseler, 333 East 43rd St., New York, NY 10017, Apt. 919

WANTED: Colorful celluloid and bakelite horns. Fancy cathedrals (repwood, chrome front etc.,) such as those by Lyric, Echophone, Jackson Bell, etc. AK Breadboards. Also looking to buy collections.
FOR TRADE: Majestic Melody Cruiser (ship radio), Bosch mantel clock cathedral, Echophone S3, Amplion Dragonfly Horn, others.
FOR SALE: Silver Cockaday receiver $90, Radiola 17 & 18 $50 each, GGH Bakelite Horn (Mint) $90, Newcomb-Halley Drum speaker $40, Arbocone speaker (mint) $45 and other cathedrals, horns, tubes, AC sets, Rider manuals, parts and literature. Send SASE for upcoming list. Fireside Wireles, 1507 Ridge Ave., New Castle, PA 16101 412-654-9335

WANTED: Early or unusual tubes, tube cans and cartons. Also, early light bulbs. Please describe and send price wanted to: Bruce Harbeck, 13408 Westwood Lane, Omaha, NE 68144 402-333-9013

WANTED: Crystal Sets, photos, history, parts, schematics, etc. for a historical and engineering study of for a book to be published by myself. Will purchase, or pay for pictures and details. Will pay for all costs along with reference credits in the book. Cannot do it without your help. Dr. B.A. Turke, 660 N. Dixie Highway, Hollywood, FL 33020

TRADE: Radio Age Vol 1, No.1 and next eleven issues bound; WD11 brass, tipped tubes (4); AK Green horn speaker, King Amplitone horn speaker; DeForest L5300 horn speaker, American (1937) SJ, carbon microphone in ring and Harmsworth wireless encyclopedias, 3 vols. 2,276 pages. SASE: F.A. Paul, 1545 Raymond, Glendale, CA 91201

FOR SALE: Riders, Howard Sams, RCA, service manuals, magazines, tubes, parts, test equipment, knobs, SW sets. SASE for list. Krantz, 100 Osage Ave., Somerdale, NJ 08083

FOR SALE: Beautiful, colorful, enamel radio-related tie clasps and lapel pins with emblems of Philco, G.E., R.C.A., and others. Must see to appreciate. Send a L.S.A.S.E. for completely illustrated list. Mr. Michael S. Sabodish, Sr., 11-A Matawan Avenue, Cliffwood, NJ 07721

WANTED: BC-348 receiver and accessories, AM signal generator, original AK76 ground clamp. G. Symonds, 26 Ossington Ave., Ottawa, Ontario, K1S 3B4

WANTED: Western Electric output tubes 300A & 300B. Need 4 or 8 of each. Marantz high-fidelity tube amps, preamps. R. Brown PO Box 725, Canaan, CT 06018 203-824-5310

FOR SALE: Model T Ford Spark Coil $15.00; 800 Radio Tubes (1930–1968) $250.00; DeForest Triple Coil Mounting $25.00. Plus shipping. F.W. Chapman, Apt. B218, 1130 N. Lake Parker Avenue, Lakeland, FL 33805

WANTED: pre-war TVs, any condition, immediate cash! Also desperately need a 30BP4 picture tube. Jim Clark, 1006 Pendleton Dr., Lansing, MI 48917 517-323-9595

WANTED: mono and early stereo tube hifi equipment, working or not, complete or parts. Also loudspeakers, magazines, manuals, etc., Jack Smith, 288 Winter St., N. Andover, MA 01845 617-686-7250

WANTED: G.E. grandfather clock radio, 1933 GE and RCA table models such as GE K-52, K-60, K-63, K-80, RCA R-37, RE-40, R-28, 28B, 28C, 28D, 28E, Zenith 829 chrome tombstone, Victor 916, 918, or 954 combinations, celluloid horn speakers, metal lamp radio, A.K. AC table models, RCA 64 console.
FOR SALE or TRADE: 3 grandfather clock radios—Philco 70, Majestic 15, Silvertone, AK 60 metal box w/speaker, A.K. 165, 944, 708, 206, 735, 184, Radio Key, Philco 70 & 90 cathedrals, Echophone 55 & 60. John Kern, RD#2, Box 457, Quakertown, PA 18951 215-538-2128

FOR SALE: Excellent Traveler Model 400TV 7 inch television set, $220.00, or trade.
WANTED: Zenith "Disc Jockey" Phonograph, circa 1950. Charles Harper, 2081 Harmony Court, Lexington, KY 40502 606-268-8549

FOR SALE: Several cathedrals; Clinton, Philco, Sentinel Tombstones; nice selection of colorful plastics; Gould "Spice Chest" novelty radio. Pillon speaker hotel set; more—SASE for list. Ed Ripley, 2276 Holloway, Maplewood, MN 55109

FOR SALE: Radios, tubes, parts, literature—you name it. Even free advice. Repair work done by licensed 'expert'. Send a large SASE for Stan's surplus stuff. It's cheap. Schematics too. Stan Lopes, 1201-74 Monument Blvd., Concord, CA 94520

WANTED: Coil rack and speaker "Diamond shaped" emblem for National NRO rcvr. Loop for Navy DAE-1 rcvr. Paul Gregg, 725 College Way, Carmel, IN 46032

PARTS WANTED: Radiola V metal covers and nameplate; Radiola 80 power XFMR or supply, Regeno Flex secondary coil socket supports & lock. RCA Victor R-35 complete chasis or parts, RCA UZ-1320 and UZ 1325 drivers. Westinghouse RA parts. Nameplate-Var. condenser-coupler, Vernier dial or junker DA parts, nameplate sockets XFMRS. Music Master 21" horn only. Timmons B Eliminator & speakers, Philco 90 cabinet & pwr. XFMR, Philco 60 chasis & spkr, 37-620 Dial Scale, misc. knobs, AN 260 KCS XFMR. Robert Husted, 270 N.W. 3rd Court, Boca Raton, FL 33432

FOR SALE: Available now, quality reproductions. Famous full color Magnavox lion decals for restoring that special horn. Pt. #A171347-B $7.50 ea. Dial Scales: Philco #27-5031, #27-5197, #27-5210 $7.50 ea. MDL 20; eyeleted to your tuning ring $8.00 ea. Radiola MDL. 16, 17, 18, 41 & 60 $7.50 ea. Sparton MDL. AC-62 & AC-7 $7.50 ea. Atwater-Kent MDL. 55 & 60 etc., $7.50 ea. Add $1.00 for shipping & ins. **NEW OLD STOCK:** "Cannon Chief" earphones hi-amp. 2,000 ohms $14.95 plus shipping. Specify PINS or PLUG. Battery eliminators for 'A', 'B', & 'C' for any antique radio. Large SASE required for info. C.A. Blais, 613 Juniper Drive, O'Fallon, IL 62269

WANTED: AK-50, 275, 558, 708 and other cathedrals & tombstones. Ophelia J. Nicholson, 3423 S.E. Long St., Topeka, Kansas 66605

FOR SALE: Vintage Radio is your reference source: a flick of the switch 1930–1950; Vintage Radio 1887–1929; Radio Collector's Guide 1921–1932; Gernback's 1927 Radio Encyclopedia; Beitman's 1926–1938 Radio Diagrams. $12.95 each postpaid. Vintage Radio, Dept. AG, PO Box 1331, N. Highlands, CA 95660

WANTED: A 913, 1" cathode ray tube, size of a metal 6L6 vacuum tube, to restore an oscilloscope. Tad Drogoski, 507 Cool Valley Rd., Jefferson Boro, PA 15025

FOR SALE: Early wood table radios AS, Emerson, Philco, Aetna, RCA, etc. 1931 to 1938; blue tubes, WD11, 201A, 199s, used but good. SASE with requests. Wally Worth, 2 W. Elm Ave., Wollaston, MA 02170

FOR TRADE ONLY: Radiola VII in good condition. Want pre 1920 set or early TV. R. Brewster, 454 Diablo Dr., Pgh., PA 15241

WANTED: Still looking for 6 (six) 486 tubes for Sparton #39. Can anyone help? John McDougall, #6, 4426 232nd St., Langley, BC, Canada, 4R1

WANTED: 2 phone type jacks, amp increase rheostat and metal tube mounting frame for Federal 58. Don Sturzenbecker, 221 S. Montana, Mitchell, SD 57301

WANTED: Schematic and/or info. on MU-Rad, type MU-15 Rcvr., loop, type of coils, etc. D.C. Sumner, 39 Parkside Dr., Davis, CA 95616

FOR SALE: Be the first on your block to build your own TV (A mechanical one). Parts and information are available from Pete Yanczer, 835 Bricken, St. Louis, MO 63122

WANTED: A IP500 or IP501 in wkg. condition. Have to trade a rare AMRAD 35-0 receiver in mint condition. Andrew Mooradian, 5 Priscilla Lane, Winchester, MA 01890

FOR SALE: QST bound volumes for 1925, 1926 and 1929 without covers, mint condition, $30 each, all above plus shipping, W3HWT, Bill Hurni, 329 Evergreen Dr., N. Wales, PA 19454

WANTED: Does anyone have a list of collectible signal corps. radios starting with WW-1? Fenton Wood, POB 2063, Malakoff, TX 75148

FOR SALE: Vintage parts, tubes, service info., test eqpt., SAMS CB manuals Vol. 1 thru 66 $5.00 ea. PPD, SASE for list. England's, 98 Montague, Zanesville, OH 43701

WANTED: Supreme test equipment and literature—Models 85C, 89, 189, 333, 385, 530, 535, 545, 570. Doug Heimstead, 1349 Hillcrest Dr., Fridley, MN 55432 612-571-1387

WANTED: Schematic for band-switchin Jackson-Bell Cathedral. Model no. not discernible. Tube line-up. 80, 58, 56, 57, 58, 57, 47, 47. Please Quote. Am told probably in Jackson-Bell Dealer Data Book. I. Yano, 80 Lehun St., Kahului, HI 96732

TWO RICH MINDS—ONE POOR INVENTION

by William E. Denk, W3IGU

Even before the founding of the first associations devoted to the preservation of the history and gear of early wireless, this writer had started his collection of patents having special significance in the early development of the communications technologies. Patents such as Edison's on the phonograph, Bell's patent on the telephone, the Morse patents on the telegraph, Marconi's earliest patents on his wireless transmitting and receiving system, Fleming's patent on the vacuum tube diode detector, the early crystal detector patents of Bose, Dunwoody, and Pickard, the Hazeltine neutrodyne patent—hundreds in all. This is a phase of our hobby that requires very little space, and it can be most interesting and revealing.

One of the early patents, which I added to my collection because of the eminence of the named co-inventors, does not seem, after more careful study, to fit into this collection of really significant patents. Had the inventors been a pair of unknowns, the patent would surely have been discarded or, at best, retained for its amusement value.

One of the inventors was Michael I. Pupin, Professor of Mathematics at Columbia University, and the inventor of the telephone repeater or Pupin coil which greatly improved long-distance land-line telephony. His patent covering that development was acquired by Bell Telephone Company in 1901. Other of his patents, on tuning systems, were licensed to the Marconi Company.

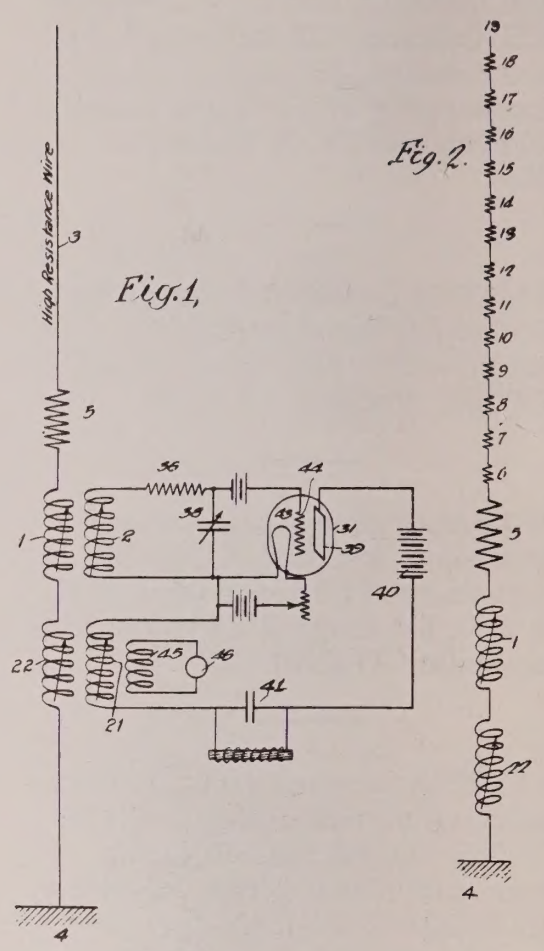
The other co-inventor was Edwin H. Armstrong who needs no introduction to radio historians. Armstrong studied under Professor Pupin while at Columbia University where Armstrong received his E.E. degree in 1913.

The patent here in question is U.S. Patent No. 1,336,378, "Antenna with Distributed Positive Resistance," application filed October 1, 1915, and issued April 6, 1920. The single page of drawing with its Fig. 1 and Fig. 2, is reproduced here in its entirety. To adjust your thinking to the filing date, 1915, recall that de Forest filed his patent application on the triode on January 29, 1907; Armstrong filed his application on the regenerative detector on October 29, 1913, and his application on the superheterodyne receiver on February 8, 1919.

For an understanding of the objective of Messrs. Pupin and Armstrong which, broadly, was to reduce the effects of static on radio reception, the second paragraph of the patent specification is reproduced below in its entirety:

> The invention relates to receiving wave conductors which are loaded with resistance in order to screen them against the disturbing effects of electrical waves, and particularly those waves which have the character of electrical pulses of short duration, known in the art as "atmospherics" or "strays." A resistance introduced into the receiving conductor, called the receiving antenna in wireless transmissions, will diminish the effects of disturbing waves and pulses, but it will also diminish to the same degree the effect of the waves which are to be received, *unless the introduced resistance is properly placed*.. (emphasis added) This invention gives definite rules which enable one skilled in the art to distribute the introduced resistance so that it will diminish the effect of disturbing waves more than of the waves which are to be received.

Referring to Fig. 1 of the drawing there is an antenna 3 of high resistance wire (as much as 300,000 ohms). This is connected to ground, represented at 4, by way of primary inductors 1 and 22. A resistor 5 is included serially in the antenna primary circuit; it may equal about "a quarter of the total introduced resistance." Fig. 2 of the patent is included merely to show that, instead of using high resistance wire in the antenna (quite a practical problem!), it would be easier to use a large number of lumped resistors, 6 through 18. The inventors note that such an antenna would "act like a perfectly uniform wire of the same total resistance, if the lumps are so spaced that there are several per wavelength of the waves" to be received. According to the inventors, the function of resistor 5 "is to dissipate the electromagnetic energy during its passage from the antenna to the receiving apparatus."



For the simplest embodiment of the invention, ignore the entire vacuum tube circuit, and observe only that detector 46 is coupled to antenna primary coil 22 by way of coupling coil 45. Ignore also the interposed coil 21 which is part of the vacuum tube

circuit. In describing this arrangement, the inventors make the unsupported statement that "we find that in such an antenna the effective resistance for waves to be received is a fractional part of the total resistance, whereas for electrical pulses of short duration the effective resistance is substantially equal to the total resistance of the antenna." Their "pulses of short duration" are, of course, atmospherics or static against which the inventors desired to discriminate.

Claim 1 of the patent is directed broadly to an antenna of the type described thus far. It reads:

> 1. A receiving conductor for wireless wave transmission having a resistance load sufficiently high to screen the system effectively against disturbing electromagnetic waves impressed upon the conductor, the said resistance load being distributed along the conductor with substantial uniformity with respect to the wavelengths developed upon the conductor by the received signals.

Now to the preferred embodiment of the invention—and here it becomes more interesting, though no more convincing. The inventors describe the heretofore ignored vacuum tube circuit as "a resistance compensator...employed for the purpose of compensating a large resistance introduced into an antenna." This compensator is, simply, a regenerative system that reintroduces energy, taken from the antenna and applied to the grid circuit, back into the antenna circuit, via plate coil 21, in such phase as to introduce a negative resistance into the antenna. In the words of the inventors, "This produces in the antenna a negative resistance reaction capable of reducing the resistance (of the antenna) to any predetermined limit for waves of selected frequency." This latter suggests that the inventors believed that the high, built-in antenna resistance would be greatly diminished for the desired signals, while remaining very high for atmospherics, thus discriminating strongly against static interference.

Claim 2 of the patent is like claim 1, reproduced above, but adds the following:

> and a resistance compensator connected to the conductor and adapted to reduce its effective resistance to any predetermined limit for received signals.

The writer found no reference to this patent in Maclauren's fine book INVENTION AND INNOVATION IN THE RADIO INDUSTRY, MacMillan Co., 1949, and didn't really expect to, but the following significant statement appears on page 184. "One of the major problems which Armstrong had been eager to solve was the elimination of static. His first work with Pupin had been in this field, and for eight years (1914–1922) he had wrestled with the task without making significant progress." Maclauren adds that, in an interview, Armstrong stated, "My early failures here were a chastening experience and it was two years before I regained sufficient confidence to tackle this particular problem once more."

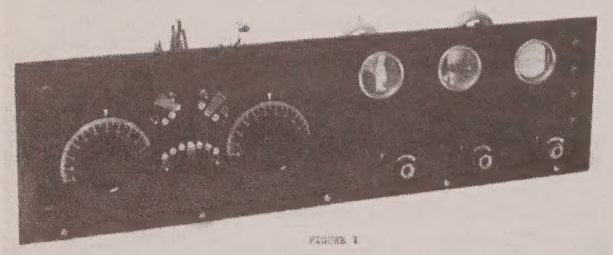
As we all know now, Armstrong's new approach to static reduction was use of the U.H.F. spectrum, higher power, wide band frequency modulation, and amplitude limiters or clippers at the receiver.

On balance, it seems fair to conclude that the Pupin & Armstrong patent does *not* belong in the discard pile. Instead it will be retained as an interesting but unproductive step in man's long effort to minimize the effects of atmospherics on radio reception. And for us more ordinary toilers, it has to be reassuring to know that occasional failure need not preclude ultimate success.

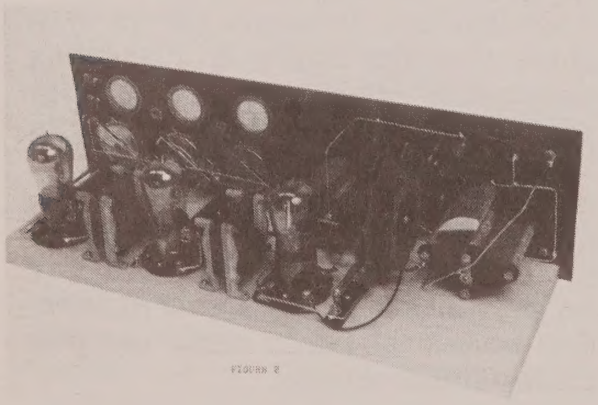
RESTORING A REINARTZ RECEIVER

Ross Smith

"The first regenerative circuit specifically designed to provide receiving stability for CW in the Amateur bands was designed by John Reinartz, which made him famous in early radio circles. Although it could do nothing about the undesirable features of the transmitters, the circuit provided at least a partial solution to the problem of unstable receivers. A broadcast-listener public, somewhat gadget-happy in orientation and seeking new ideas, embraced the Reinartz circuit. Components for this circuit were widely sold in kit form, almost always with a spiderweb coil that was used as the inductance." Paul C. Crum, W9LC



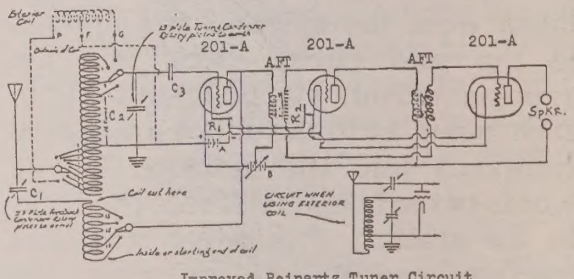
About 15 years ago, I purchased a Reinartz set, with tube sockets and audio transformers missing, from Dave McKenzie and just this winter scheduled time for restoration. Figure two



of the back view shows the spiderweb coil arrangement with the antenna and grid coil to the left and the feedback coil to the right. The most popular coil design in the early 1920's had all three coils, with their taps, wound on one large spiderweb form, as shown in figure three.

The advantage of the two separate coils is that the feedback can be set at optimum gain by adjusting the distance between the two coils with the mounting screw. This is a fixed position and not adjustable with a slider like early Crosley's and others.

The circuit shown in figure four is from QST, March 1922. The exterior coil arrangement shown, to be mounted on the top of the cabinet, was for expanding the normal range of 135–370 Meters up to 600 Meters. I added a two to three megohm grid



Improved Reinartz Tuner Circuit

FIGURE 4

leak to the detector circuit from grid to ground and a .002 mfd. mica condenser for an RF filter from the detector plate to ground.

I was pleased with the performance of the set, both headphone operation from the detector only and from the audio output stage for loud speaker operation. Tuning is quite easily accomplished, once you get the hang of it. One or two fixed mica condensers can be switched in parallel with the tuning condenser for added range. Note in figure one that there are jacks for detector, first AF stage and second AF stage. Rheostats may be turned to "off" position for stages not being used, thus lowering the "A" battery current. One ampere 201 tubes are used with 22 1/2 volts on the detector plate and 45 volts on the AF amplifier plates. Higher plate voltage causes distortion and loss of signal because there are no "C" batteries provided.

There were many variations to the Reinartz circuit and amateurs and home builders used whatever components were available. Pfanstiehl Radio Service Company of Highland Park, Illinois and Elgin Radio Supply Company of Elgin, Illinois were two of many who offered Reinartz spiderweb tuning coils. Elgin offered the entire kit, called the Elgin Super-Reinartz Radio, complete with cabinet.

This was one of my most interesting and rewarding restorations. A special "thank you" goes to Paul C. Crum for his permission to use a paragraph from his publication in Ham Radio Horizons, September 1979, and to Floyd Lyons for furnishing the circuit in figure four, coil data and his many letters of explanation and encouragement. Also contributing to this project were Alfred Sayer, W8ZA0 and George Hausske.

References

AWA Old Timer's Bulletin 1-4-2 and 16-4-34

222 Radio Circuit Designs by C.C. Wells and Elmer H. Lewis, Henley Publishing Company, 1924, pages 130–133.

QST June 1921, March 1922 and September 1924 (All wave modification).

Radio News June, 1924, page 1758.

PILOT MODEL TV-37

by Don Patterson

Although I am not a TV collector per se, one of the cutest and fairly popular sets is the 3" Pilot TV. It was introduced in 1949 as the first set to be priced under $100 at a retail price of $99 and was manufactured by the Pilot Radio Corporation of Long Island, New York. As advertised, the set came with a magnifier (glycerine filled) to enlarge the viewing area and contained twenty-one tubes in addition to the electrostatic deflection picture tube.

Not many of these sets have survived the ravages of time as the heaters of the tubes and the picture tube were connected in series. With full line voltage applied a large surge of 10 or more volts is placed on the picture tube's 6.3 volt filament. As a consequence, many of those found today are defunct.

Over the past few years, I have restored perhaps a dozen of these and now I can pass along several tips which will help you bring one new and prolonged life.

First, for those of you who discover you have a bad CRT. There is salvation for you. B-SCAN, 2427 N. 4th St., Philadelphia, PA 19133 (215) 425-3450 can provide you with a new one for somewhere in the neighborhood of $96.00

Assuming you already have a good 3KP4 or have purchased one, you can begin your restoration. A good place to start is to prevent future picture tube filament burnouts from surge voltages. The best way to do this is to substitute a 15 ohm 20 watt wirewound resistor in the filament circuit. Then purchase a 6.3 volt 600 ma. filament transformer and mount to rear of the high voltage can. Wire the leads to the leads from the picture tube socket. Check all of the 3 ohm resistors in the filament circuit and replace with 3.3 ohm 1 watt 5% carbon resistors if the tolerance has increased 20% or more.

Now you have solved the major problem and you can continue by replacing all of the paper capacitors one by one with mylar types. Be sure you replace all of the electrolytes as well filtered B+ is essential for good sync. While you are replacing capacitors it is also a good idea to check all resistors and replace if they have increased by more than 20%.

During this part of the restoration, you will stumble across some big fat .005 condensers rated at 3KV. By all means replace these with disc ceramic capacitors of same rating. One last thing, use the resistance measurement of diodes and check the video detector diode.

You don't have to be a TV expert to get one of these going, just careful replacement of parts. If you get stuck you can resort to the schematics available in Rider's TV Volume 2 and Sams Photofact Folder 62. Good luck and happy viewing!

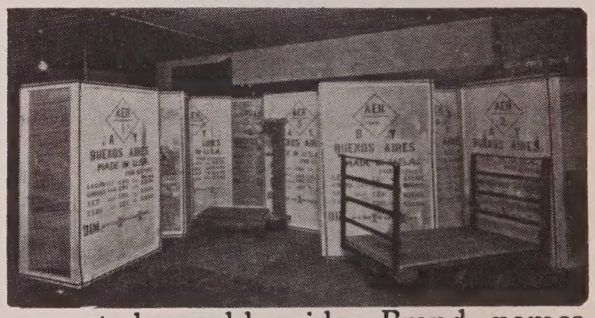
MADE IN U.S.A.

by John W. Stokes*
Auckland, New Zealand

It is probably difficult for most present-day American vintage-radio buffs to visualise the pre-eminent position held by the U.S. as an exporter of radio receivers and components in the days between the two World Wars. Although, politically, the U.S. had adopted an isolationist policy, this policy certainly did not extend to foreign trade; quite the reverse in fact. American made goods of all description earned world-wide respect for their quality, and mass production techniques ensured that the price was right, too. In those days three of the things the U.S. was best known for in other countries were automobiles, movies and radios.

It has long been accepted that for any country to build a strong export trade in manufactured goods, it is necessary to have a strongly based home (domestic) market and the U.S. certainly had that. The rapid acceptance of radio broadcasting as a new means of in-home entertainment brought about a whole new industry: one which developed more rapidly than in any other country in the world.

Foreign competition was virtually unheard of in those days—it was all one-way trade. American radios were



exported world wide. Brand names which became household words in the U.S. became equally well-known in many other countries. This was particularly true in English-speaking countries, such as the one in which this scribe resides—New Zealand.

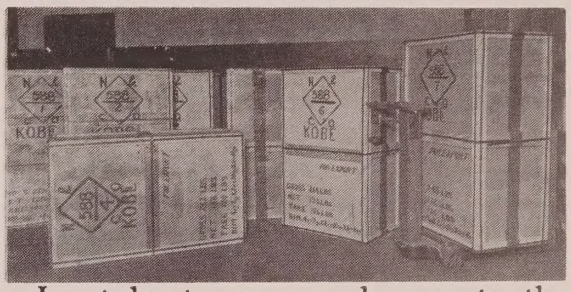
A few imported radio items did reach American shores—Amplion

horn speakers, Garrard record changers (used in Scott radios). What else? Certainly no foreign radios. But wait, there was one. During 1929–30, the New York department store of John Wannamaker & Sons imported two models of a British 'Rees Mace' portable. These had the distinction of being the only British sets ever to be included in *Rider's Perpetual Trouble-shooters Manuals*, and one even made the front cover of *Radio News* many years later in 1939.†

Although in some areas, South America for example, U.S. manufacturers encountered little or no competition, in other places it was a different matter. But even in countries where radio manufacturing was well established, American receivers could easily compete in respect of quality, performance and price. In fact, some countries sooner or later found it necessary to restrict the importation of foreign radios in order to protect their own industries. In some cases this led to American firms setting up manuacturing units overseas or else licensing other companies to use their designs. A well-known example was the establishment of British Philco back in 1932. Philco later expanded into other countries, for example Australia in 1936 and New Zealand in 1939. More familiar to Americans will be the U.S. radio industry's involvement in neighbouring Canada where many American companies became firmly established.

But it was not just in the area of receivers that American influence was apparent. Right from the earliest days, American components and accessories were widely sold outside the U.S., particularly in British countries, and indeed were often preferred by receiver manufacturers in those countries. To cite an example: for many years during the 1930s one of the largest British manufacturers of high quality radios used C.T.S. volume controls and Yaxley wave-change switches.

As in the case of complete radios, this also led U.S. components manufacturers to establish manufacturing units overseas or to license foreign companies to use their designs and trade names. In this way such well known American names as Centralab, Cinch, Clarostat, Erie, Jensen, Magnavox, Oak, Rola and Mallory-Yaxley became familiar on the other side of the Atlantic and even further afield.



In at least one case known to the writer, this caused unexpected repercussions. Here is what happened: a New Zealand importer had long held the agency for American Jensen speakers, one of his best selling lines. Then one day, much to his consternation, 'Jensen' speakers arrived in this country from another source. The Jensen Radio Mfg. Co. had recently concluded an arrangement with the Plessey Co. of Great Britain to allow the manufacture of Jensen speakers under license in that country. No sooner had these new 'Plessey-Jensen' speakers appeared than they were imported by the N.Z. agents for Plessey; hence two same-but-different Jensens on the market, thus effectively nullifying the sole-agency status of the original importer. But, business was business and all he could do about it was to have the offending word 'Jensen' removed from the British speakers.

Quite apart from the actual hardware, however, American influence made itself felt in another area, that of patents involving receiver circuitry. Because, in the days of which we are speaking, so many patents were of American origin, manufacturers in other countries were required to pay tribute by way of patent licensing

when they used those circuits in their receivers.

Then there was ham radio. For so many years American commercially built ham receivers were not only 'tops' but they were the only sets of their kind built anywhere in the world. Now, with the passing of time, they, too, have gone the same way as their broadcast or all-wave cousins and become today's collectibles.

Finally, to strike a personal note, it is difficult when one reaches 'old-timer' status not to dwell on the glories of the past, and sometimes to wonder if future generations will ever look back with similar feelings to the high-tech scene of today.

*Author of *70 Years of Radio Tubes & Valves*, and *The Golden Age of Radio in the Home*

†See p. 22 of *The Golden Age...*

COLLECTING CAN BE HABIT FORMING!

by Gary B. Schneider

Like most collectors, finding and collecting old radio items made in your home-town has more meaning than if they were manufactured elsewhere. Such is the case with myself. Residing in Cleveland, Ohio, area I am constantly in search of radio items made there. During my early years of collecting, I noticed advertisements in some 1929 radio

magazines for a device called the Geo. W. Walker "Multi-Unit" (Figure 1). For those of you not familiar with the "Multi-Unit," it is nothing more than a 1-inch tube device that had many multi purposes such as a Short Wave Receiver, Short Wave Adapter, R.F. Oscillator, Wave Trap, R.F. Amplifier, 1-tube Receiver, and other uses as described in the advertisement (Figure 2). This versatile arrange-

A Radio Utility and Entertainer

George W. Walker "MULTI-UNIT"

A Device with a Dozen Uses

SHORT WAVE RECEIVER — SHORT WAVE ADAPTER
REGULAR BROADCAST RECEIVER
SCREEN GRID PRE-AMPLIFIER — R. F. OSCILLATOR
EXTRA STAGE OF R. F. OR "BOOSTER"
RADIO "EXPERIMENTAL" UNIT
CRYSTAL RECEIVER — WAVE TRAP — WAVE METER

One of the most unusual radio instruments ever devised. Will perform any individual function of a complete receiver, and in addition may be used for calibrating, testing or checking. Makes a wonderful broadcast receiver, short wave receiver or transmitter. Oscillates violently over the entire scale range from 550 meters down to 15. Uses all tubes 199 to 210 and all voltages, A.C., D.C., or rectified. Nothing like it ever placed on the market before.

The Radio Fan has at his disposal a device which will provide him with something to tinker with for an entire season without performing the same experiment twice. Become acquainted with all the circuits and the way tubes perform under particular conditions.

The Dealer and the service man require this most valuable instrument for adjusting radio frequency circuits to resonance, providing a beat note or constant frequency oscillation for determining wave length of a particular condenser setting, calibrating a receiver dispensing of trade-ins and obsolete sets by making them up to date by the addition of an R. F. amplifier.

NO ANTENNA-GROUND NEEDED

When using the Multi-Unit with most any receiver as an R. F. Booster (extra stage T. R. F.), the sensitivity increase is sufficient to make unnecessary the use of outside antenna. Tone quality is immediately improved. Less external electrical interference assured.

SHORT WAVE CONVERTER
(15-95 Meters)

Enjoy the novelty of short wave experiments by converting your present receiver to tune to the low waves. Utilizing the audio amplifier in your own receiver serves a dual purpose and increases volume and range. Plug the unit adapter into the detector socket of your set. No change in wiring or extra tube required. The Multi-Unit will function with either A. C. or D. C. receivers.

R. F. PRE-AMPLIFIER

Uses same type tube as in the R. F. stages of your present receiver. 199, 201-A, 225, 224, 238 or 227 tubes may be used. Either A. C. or D. C. Extreme selectivity. If you prefer. Tune in stations you never heard before. This efficient circuit reduces static and other interference. Greater clarity results as the additional volume makes over-loading of tube distortion unnecessary.

SCREEN GRID R. F. BOOSTER

Increases the range and volume of your present receiver to equal the latest improved Screen Grid Receiver. Merely insert unit adapter plug in socket of your receiver. No change in receiver wiring. Adaptable to either A. C. or D. C. receivers.

SHORT WAVE RECEIVER
(15-95 Meters)

Experiment with the fascinating short waves. Tune in stations thousands of miles distant. Reception of short wave Foreign stations has been verified. Ideal all-year-round reception. Warm weather in Australia and New Zealand is winter in this country. Hundreds of short wave stations thruout the world are listed.

SINGLE TUBE RECEIVER

Ideal for either short wave or regular broadcast band.

SHORT WAVE R. F. BOOSTER

Connect the unit ahead of your short wave set and hear stations with greater volume. Uses screen grid or 201-A type tube.

R. F. OSCILLATOR

Check your receiver for wavelength and calibration. Determine location of circuits, test tubes for oscillation and regeneration, neutralizing receivers, balancing condensers, laboratory measurements, short distance transmission and generating a beat frequency for superheterodynes.

There are numerous additional uses, a few of which are wave meter, Loop R. F. Amplifier and growler for measuring efficiency of shielding material. By the time an experimenter has exhausted the possibilities of this instrument he will be qualified for a radio engineer.

Consists of the essential parts of an oscillatory circuit, and in addition are plug-in coils, adapter cord and plug, bridging connections, and extra wires along with well detailed instructions for many major experiments. Entire unit contained in case 7½ inches by 5 inches by 5½ inches. Price **$16.00**

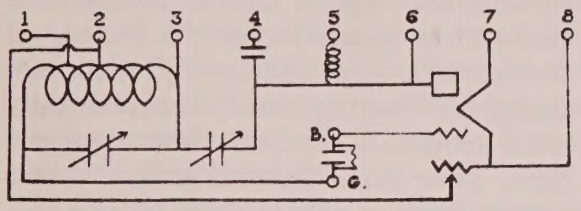
AT YOUR DEALER OR MAIL YOUR REMITTANCE DIRECTLY TO FACTORY

THE WORKRITE RADIO CORP., 1836 E. 30th Street, CLEVELAND, OHIO

SERVICE MEN—DEALERS—JOBBERS—MANUFACTURER'S AGENTS WANTED

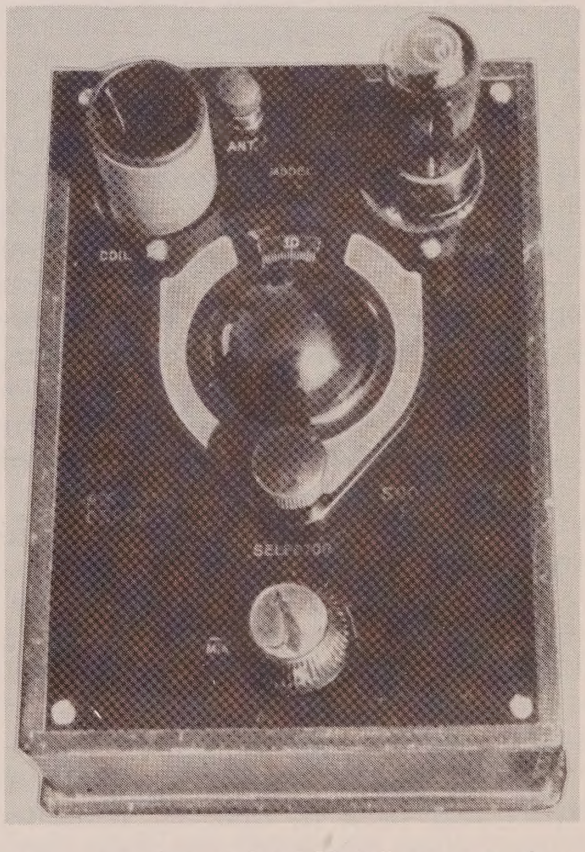
ment was made possible by the use of plug-in coils and the way the tube connections were wired to external binding post, thus permitting many circuit designs (see Figure 3).

Circuit Chart is Interesting



The "Multi-Unit" looked like a neat thing, so I put it on my list of "high priority" items to find. So now my search for one of these units was in high gear. My dreams came true one day while walking through an Antique Wireless Association flea market about six years ago. There sitting on a seller's table was this little box with its tube and coil sticking out of the bakelite panel. With my heart pumping rapidly, I quickly lunged for it on the table, as a slight delay may have enabled another collector to grab for it too, Those of you who have been to an A.W.A. flea market know what a little hesitation can mean—wait a few seconds and it may be gone!

Took the Walker "Multi-Unit" home and gave it a quick cleaning and polishing. After six years, it still sits proudly in my show case, complete with its original box and instruction booklet. Sounds like a happy ending to a dream come true. Well not really, for I caught another collecting disease. I am now collecting Walker "Multi-Unit" clones or lookalikes. With the huge success of the "Multi-Unit," other companies soon got into the market and manufactured their own. Over the years, I have added to my collection the A.C. Dayton Flewelling Short Wave Adapter (Figure 4) and the Air-King "Perfect" Short Wave Adapter (Figure 5). Also in my collection, but not pictured, are the Radio Products Company (Dayton, Ohio) Flewelling Short Wave Adapter and the Geo. W. Walker "Flexi- Unit." The "Flexi-Unit" is the



same as the "Multi-Unit" except that it has a cast aluminum base to prevent the effects of hand capacity. So you can see my desire to have the Walker "Multi-Unit" has led me to another collecting interest. And from

reading more magazine ads, it looks like my quest has not ended, for there are others that I would like to have. This short insight to one of my collecting interests is not meant to describe the actual short wave adapters themselves, but to make you more aware of the many unusual items you can collect other than "just radios." These adapters have been written about in various magazines. Reading the references below would answer most of your questions about them.

References:

[1] Radio News Magazine—Jan. 1929
[2] Radio News Magazine—Oct. 1929
[3] Radio News Magazine—Nov. 1930
[4] Citizens Radio Call Book Magazine—Sept. 1930
[5] CQ Magazine—Nov. 1980

RESTORING YOUR WAY INTO HISTORY

William B. Fizette, K3ZHW

Perhaps this article should be entitled "Restorations I Have Known," or "A Trip to the Past," or some such with more catch to it, but whatever we call it, I would like to share with you some of my experiences with restorations of old receivers. Being a ham, my interests also include transmitters and other station hardware, but for now I will restrict myself to the king of the radio station, the receiver.

Almost any simple one-tube oscillator circuit will function as a transmitter, but to do a decent job a receiver needs to be fairly complex, and as the art developed and the demands multiplied, the receivers did become more complex. It can be a fascinating and educational experience to travel back in time by restoring some of the landmark sets of the early electronics era, starting with the communications receivers and the classic 3-banders of the late 1930's and going back to the simple circuits of the pre-tube sets.

The people who work with modern solid-state electronics consider vacuum tubes to be noisy and troublesome things which, because of high voltage and current requirements, cause the associated circuits a lot of trouble and a high rate of failure. For those of us interested in the history of communications, however, they are things of beauty, and because they were around for only a relatively short time, have now themselves gone into history and to the shelves of the collectors. It was around these devices that the receivers of the 1920's, 30's, and 40's were designed and used during a period of profound changes in world society. Embryonic during World War I, they played a major role in World War II, and constituted sigificant stepping stones to the world-wide and space communications systems of the present day.

The 1930's especially witnessed important technological advances as the demands on the communications industry grew at an ever increasing pace. As the decade began the radio amateurs, and much of industry for that matter, were using simple regenerative receivers such as the National SW-3. The airline industry, beginning to grow out of its cradle, required better communications, and the National AGS, a commercial superhet of magnificent construction, was the answer for a while. Hams, unfortunately, could not afford this prince of receivers, so other offerings such as the Hammarlund Comet Pro and the National FB-7 came along at more reasonable prices.

As new tubes appeared on the scene, and as improvements in other components and basic circuitry surfaced, receivers achieved new heights in stability and frequency reproducibility. In October 1934 the National HRO was announced, and from then on there seemed to be no limit to what could be achieved. In the few remaining years before the Second World War, a whole line of receivers

by National, RCA, Hallicrafters, Hammarlund, Patterson, Breting, Sargent, Silver, Tobe-Deutschman, and RME hit the market. At the same time the general public was being introduced to international short-wave via the 3-band superhet, with manufacturers such as Philco, RCA, Scott, and McMurdo Silver making their mark. Advances in the communications art continued to come thick and fast even during the depression.

At the same time a third class of gear was being designed, tested, manufactured, and put into service with little fanfare and attention by the public. Most of the classic pieces of military gear used during WWII were actually designed in the 1930's, and included military versions of the well-known HRO, the Hallicrafters SX-25 and SX-28, and the Hammarlund Super Pro, as well as specialty receivers such as the Navy ARB, the ARC-5/SCR-274N series, the Army Air Corps BC-348, and the US Army BC-342 series. All of these are excellent candidates for restoration.

So why restore? By definition "restore" means to bring back or put back into a former or original state. We "restore" because it is very difficult to find vintage sets that are clean enough to put into a collection. One who gives a receiver a simple surface cleaning is "restoring," but for the most part the ravages of time and the attentions of previous owners have left us with a bit more of a job. These were the products of America's early machine age, the sometimes bumbling but always progressive attempts to become a part of a reliable world communications system, and if we are interested in the history of electronics communication they are worthy of our attention.

To Begin

The restorer has all sorts of radios to work with, with each piece a separate series of challenges. There are wood cabinets, steel cabinets, and aluminum cabinets. There may be a breadboard with no cabinet at all. Sets may be large or small, highly ornate or very plain, hand crafted or from the mass production lines. Their condition can range all the way from mint (not seen very often) to the proverbial "basket case" (much more common), but whatever the origin, each poses unique problems to the restorer.

The writer has an interest in the receivers made by the National Company and during this past winter has restored several of these. There will be frequent references in this article to the HRO for this reason, but it is not my intention to limit the attentions of others. Techniques used on one receiver will often work quite well on another of similar construction. In the communications receiver group, however, the HRO stands out as an example of a set with excellent mechanical construction and a straightforward electrical layout. Furthermore, the set is relatively light as these things go, since the power supply is separate. A war surplus HRO is still not too difficult to obtain, and would be a good project for a beginning restorer.

Restoration of a piece of electronics gear, like restoring an old car, involves much art, a large amount of patience, and specific objectives. Widely varying skills are required but for the most part relatively simple tools will suffice.

A good rule to keep in mind is the one given to embryonic physicians, "First, do no harm." Remember, too, that there are some details of construction that are extremely difficult to duplicate in the home workshop. National, for example, used a lot of brass rivets to fasten parts to the chassis. If you have to take the parts off, drill out the rivets, replace with period hardware, and while accepting the job as less than perfect, take pleasure in the improved appearance.

At this point I apologize to our overseas and Canadian brethren for

restricting my comments to American receivers. Not having worked with foreign gear, I am not familiar with it. Hopefully, what I discuss in the following paragraphs can be extrapolated to other sets.

A Question of Time

A major shortcoming of beginners is to attempt to do too much too rapidly. Paints and varnishes must be given time to dry before the piece is handled, wood glues need a day or so to set up, and so forth. The time factor, coupled with inattention to detail, results in many restoration attempts turning out less than satisfactory.

Consider that this set now on your bench has slowly deteriorated over a period of years, and it is unlikely that you will turn it around in a few hours. If you want to put a dollar value on the time you may be investing, once you go beyond a simple cleaning and touch-up, ten cents an hour might be a good average.

On the Outside...The Cosmetics

The outside appearance of the set is extremely important. To be worth while the piece should be clean and devoid of major surface damage, and getting to this point is usually the most difficult part of the restoration procedure. If you are lucky in your acquisition, the parts will be all there, they will be the correct ones, and a simple cleaning will be all that is required.

A good clean-up is the first order of business. But wait a minute and take a look at what you are working with. Do you have an idea of the value of the set? A rare DeForest, Federal, or Kennedy will certainly command much more respect than, say, an AK-20 or a 1939 Philco table radio. With the former, the basic rule is "the least is the best." From a value consideration alone, my approach is a careful and slow cleaning with the mildest of agents. Hardware is taken apart very carefully to avoid tool marks, and woodwork is wiped down with Scott's Liquid Gold or a similar product. Waxes tend to build up and get dull, so they are used sparingly or not at all.

My basic reconstruction tools are very simple. I get good results with Butchers Wax, fine steel wool, and a very fine rotary wire brush chucked into an electric drill held in a vise. Good nickel plated hardware from the 20's and 30's usually has a heavy enough plate so that it will shine up nicely. The solvents in the wax are important to the cleaning process, so keep the lid on the can as much as possible. Metal cleaners will work with brass, but avoid scratching the piece.

For some, including the writer, refinishing of wood cabinets so that the job is decent is the most difficult of tasks. Techniques vary widely, and most give good results in skilled hands. Some workers strip all the original finish off, and after doing necessary repair work, restain and refinish by spraying with modern lacquers or polyurethanes. One restorer reported that he uses discarded party hose to wipe on successive coats of diluted polyurethanes. Not having a spray set-up, however, and not being too proficient in these matters, I have used the Formby approach. The rubbed oil finish is not what was on the original in most cases, but it looks very nice indeed. If you wish to be totally faithful to the original, get the books out and study up on varnishes used back then.

Refinishing, though, be it on wood or metal, faces a major problem in dust contamination. Dust particles must be avoided at all costs, and this is one of the reasons for the use of modern fast-drying finishes.

Spray-can paints are available in a wide variety of colors, and these can be used to advantage unless you run into a color that is almost impossible to match. One example is the dark battleship gray used by National on

their HRO and NC-100 series receivers. One suggestion: Become friendly with a local automotive body shop and let them do metal refinishing. Likewise, a cabinetmaker who has the proper facilities can make your job much easier. Take the piece in ready for refinishing, however, as he is not in the radio restoration business.

There is another hazard to this type of work and it involves personal well-being. The solvents in most finishes are quite volatile and can constitute a significant health hazard, especially if used in a confined work area. Sprays are particularly dangerous, and it is recommended that work be done outdoors on a day with still air, or by using a spray box in a well-ventilated area. Dust particles, which are also dangerous, can be filtered out by a particle mask, but this is of little help with solvent fumes.

If you have to do repairs on wood cabinets, use a minimum of glue. Veneers can be purchased and can be used to advantage; I talked to one restorer who, if the piece is valuable enough, may strip all the old veneer off and completely redo it. The Constantine Co. in New York will send you a catalog of rare and unusual woods...it costs a buck and is well worth it.

The "black boxes' communications receivers with the crackle finishes present different challenges. First clean the cabinet, and if most of the finish is intact, you may get by with a misting of black paint to cover the blemishes, or even a good wipe-down with Scotts Liquid Gold. If in bad shape, however, strip it down with a paint remover, reprime, and re-crackle. Illinois Bronze makes a line of crackle finishes, including British Brown and Jet Black, but I have yet to find the alligator finish used by National and General Instrument in the '30's.

A lot of sets, both wood and metal, finished off the cabinets with decals. Philco and Hammarlund used this approach, and National in their NC-100 series actually engraved through the painted finish into the aluminum panel. The effects are pleasing, but restoration is difficult, and there are no easy answers. With decals, you might be able to work around them, carefully. With engravings, try filling the cavity with a material which can be removed later, leaving the clean metal. Scratching dry paint out of engravings generally gives poor results.

Grillcloth from the BC sets, if not badly torn, can be made to look good by using a dry-cleaning solvent, not with soap and water. Some replacement designs are available; check the catalogs.

Once the cabinet is decent, I set it aside and concentrate on the innards. Again, cosmetics is at the top of the list. Hardware is removed and cleaned, unless the plating has rusted through and it is impossible to clean. This has happened to me with the AK-20's, for example, and unfortunately it is impossible to find modern equivalents.

The old pieces must be reworked. Some restorers have described simple nickel plating procedures, and if you are serious about the job, this is the way to go.

Cleaning a chassis with all the parts mounted on it can be a real trial. If it is simply a matter of grease and dirt, a good dunking in a suitable cleaner may work. Articles have been written about this approach, but caution is advised as delicate inductances and switch contacts can be damaged. Fruit acids (try tomatoes in a steel pot, a recent note advises) will clean metal work and variable capacitors, but it would be a good idea to neutralize the cleaned pieces with baking soda before the final wash.

In the case of the National HRO and NC-100 series with the gray painted chassis, there will often be areas of corrosion through the paint. You may patch the spots, carefully

matching the paint, or strip the chassis all the way, refinish, and then rebuild. You will get the best job this way, but it is time-consuming. It helps to have a similar set along-side to refer to.

Finding the Missing Pieces

"But can you get the parts and tubes?" Surprisingly, the answer to this often asked question is "Yes", but you will have to work at it. Tubes can be had, for the most part, from suppliers who advertise in the various publications, and other parts such as coils, tube sockets, switches, knobs, and so forth can be salvaged from "parts" sets or picked up at flea markets. One of the hardest things to find, in my experience, is vintage hook-up wire. In reworking the HROs, for example, the black, braided National wire has so far eluded me, and I usually try to rework the old wire by cleaning it with Butchers Wax. If the rubber under the braid is hard, I have to work around it or replace the piece. It cannot be worked with. The rubber-covered wire used in the Philco 3-banders is notorious for disintegrating, and the bad pieces must be replaced.

Bus wire, both round and square, and old-style spaghetti, can be purchased. Knobs which are hard to find can be reproduced...see the ads. Dial cords can be restrung. However, parts which were made of white metal are often bad and may be hard to replace. The Stromberg-Carlson Treasure Chest, some of the Grebe sets, and the early Crosley Gembox AC receivers are examples of these. Sometimes the parts can be repaired with epoxy, but often they are beyond hope and must be replaced.

Another example of a scarce commodity is the line cord resistor used in the early AC-DC receivers. Fortunately, a recent issue of the Gazette treated this problem, and told how to resolve it using modern solid-state techniques.

Using correct parts is a MUST. Contest judges will quickly determine if the proper components are present, since to the trained eye even small details such as cadmium plated hardware used in place of nickeled parts are readily apparent.

In cleaning the old celluloid dial faces be very careful with the inked markings. Use only the mildest of soaps and the softest of brushes and proceed slowly, as exposure to light over the years tends to make some inks very fragile. Replacements are not easy to obtain.

Rebuilding Components

This is frequently done, for both cosmetic and electrical reasons, as the easiest and fastest way to turn out a good-looking job. Atwater-Kent audio transformers, which are often open, can be gutted, the insides replaced with a small modern transformer, and the original potting compound poured back. In a similar manner, it is possible to even rebuild old by-pass capacitors by replacing the insides with modern Mylar or metalized capacitors. In the Zenith sets with distinctive markings on the caps, it might be worth the effort. The Philco sets used unique black bathtub caps screwed to the chassis with a long metal screw...the insides of these can be replaced with small disc ceramics and the wax melted and replaced.

Take a look at the tuning capacitors in an HRO or one of the NC-100 receivers. They are usually dirty, greasy, and with rusted studs. It is possible to clean these by taking them apart, chucking the rusted studs in a drill press, and using emery cloth to take the rust off. Metal end plates can be cleaned with fine steel wool and wax. I finish all metal parts with a good coating of wax before reassembly. If a stud breaks, you will have to take it to a machine shop...it happened to me

and I did. They fixed it, charged me eight bucks, and I kept going. I found it is important, incidentally, to replace the studs in the original position to avoid warping the capacitor. Clean the gear box and replace the lubricant with Lubriplate or a similar material. The PW dial is a special case, and instructions for taking it apart and cleaning it were given in the Dec. 1983 AWA Old Timer's Bulletin.

Do Your Homework

In the writer's experience, many novices in the restoration game neglect the paper work preparation phase of reworking a receiver. It is a good idea to find out everything about the receiver you can before you begin to work on it, as the information you uncover may alter your objectives. You may find, for example, that it is a relatively rare model, and as such has much more value if it is not "restored." I can't overemphasize the value of a good library as a source of dates, pictures, and circuits. A set of Riders is invaluable, and Volumes 1 through 18 will cover most of the receivers through WW II. Other publications, such as Radio News, QST, and Radio World from the time period are very handy. A number of hobby publications, such as Radio Age, the ARCA Gazette, and the AWA Journal (also known as the OTB) publish on a regular basis. Books on the subject are also available.

So You Want it to Work

If you want the set to "play," you now assume the hat of the radio repairman. If you don't know the techniques, get some books and start reading. Remember that your goal is to get the set to work, using the original circuit. You are restoring, not redesigning or converting. Many of the communication receivers from the 30's and military receivers of the 40's fell victim to hams and the rash of upgrading articles which appeared in the late 1940's and 50's, and it is the job of the restorer to put them back to the original condition. It was not uncommon, for example, for a receiver to have all the original 2.5 volt tubes replaced by miniature higher performance tubes. Restoration requires locating vintage sockets of the proper style with matching shields and hardware.

Before you do anything else, locate the circuit diagram and redraw it so you understand it, as quite often the originals were poorly drafted and difficult to read. Redrawing makes the restoration much easier, and you will be less likely to make a wiring error. Another benefit, besides saving time and providing greater assurance against "smoke," is that you will learn more about the circuit. Some of the 1930's hook-ups were innovative indeed.

If the circuit was a bummer to start, so be it. Remember that most of the older TRF sets needed a good antenna, as they were not too sensitive. The regenerative receivers, on the other hand, are often overloaded by modern high-level signals, so use a shorter wire and a series capacitor.

Some of the older sets with the lower value paper filters will work right away, believe it or not. On the other hand, the receivers with the electrolytic filters usually will not, at least for very long. I usually leave them in place, snip the leads, and wire in small higher capacity fresh tubular replacements out of sight. I also replace all high-voltage by-pass caps, as they are often very leaky, and can overload the power transformer. In fact, it is not uncommon to find receivers from the National NC-100 series with the distinctive original transformer missing and a replacement wired in. I routinely replace all interstage coupling capacitors, as they are usually bad. At this time I decide if it is worthwhile to rebuild the

bypasses as described above. They will look old and act new, but it does take time.

Next, I check all the resistors, and if within 10% of original value leave them alone. If I have to replace, I try to find vintage parts. Don't neglect the coils...they were often of very fine wire which could have corroded, and it may be necessary to rewind one or more. If the set has been in a basement for a period of time, and you want it to work well, consider taking the coils apart and actually boiling the moisture out in a beeswax-paraffin mixture. WARNING: Highly inflammable; please don't burn the house down.

Work carefully and methodically for best results. Remember that old wire tends to take solder poorly, so examine each connection. I use a head magnifier, available at Radio Shack, with good results. Toggle switches, which may give a satisfying "click," may not be working at all. Test them with an ohmmeter, and lubricate with contact cleaner and/or WD-40.

You will find that many of the mass-produced BC sets, and even some of the communication receivers, are difficult to work with due to the confusion of wiring and components under the chassis. If old wire is in danger of shorting, replace it, and when you work with more than one circuit at a time, make lots of notes, as the memory can be very short.

Often in the enthusiasm of accomplishment the equipment being worked on will receive rough treatment on the workbench. Remember that components can be delicate and are easily scratched or otherwise damaged by stray tools, bits of solder, or by the sheer weight of some of the old clunkers. Keep the area clean and protect parts such as aluminum IF cans, celluloid dials, etc.

What about test instruments? You can get perfectly satisfactory results with a VTVM, a capacitor testor, and a simple frequency/audio generator, often available at very low prices at flea markets.

Finally, if you are determined to "plug it in" before doing any work on it, at least take the precaution of applying power slowly through a Variac while monitoring the B+ voltage with a VTVM. For more on this subject, refer to an article by K4KJ in a back issue of the AWA OTB.

Doing the Paper Work

Not nearly enough attention is paid by restorers to documenting a particular piece of gear that is added to a collection. It may have a unique background known to the restorer or more likely to the source it was acquired from. Consider that the previous owner may be elderly and may be able to provide information at the time of the transaction which might be of future interest, but within a year these details may have been forgotten. The process of restoring the radio may have provided diagrams, magazine references, and other review articles.

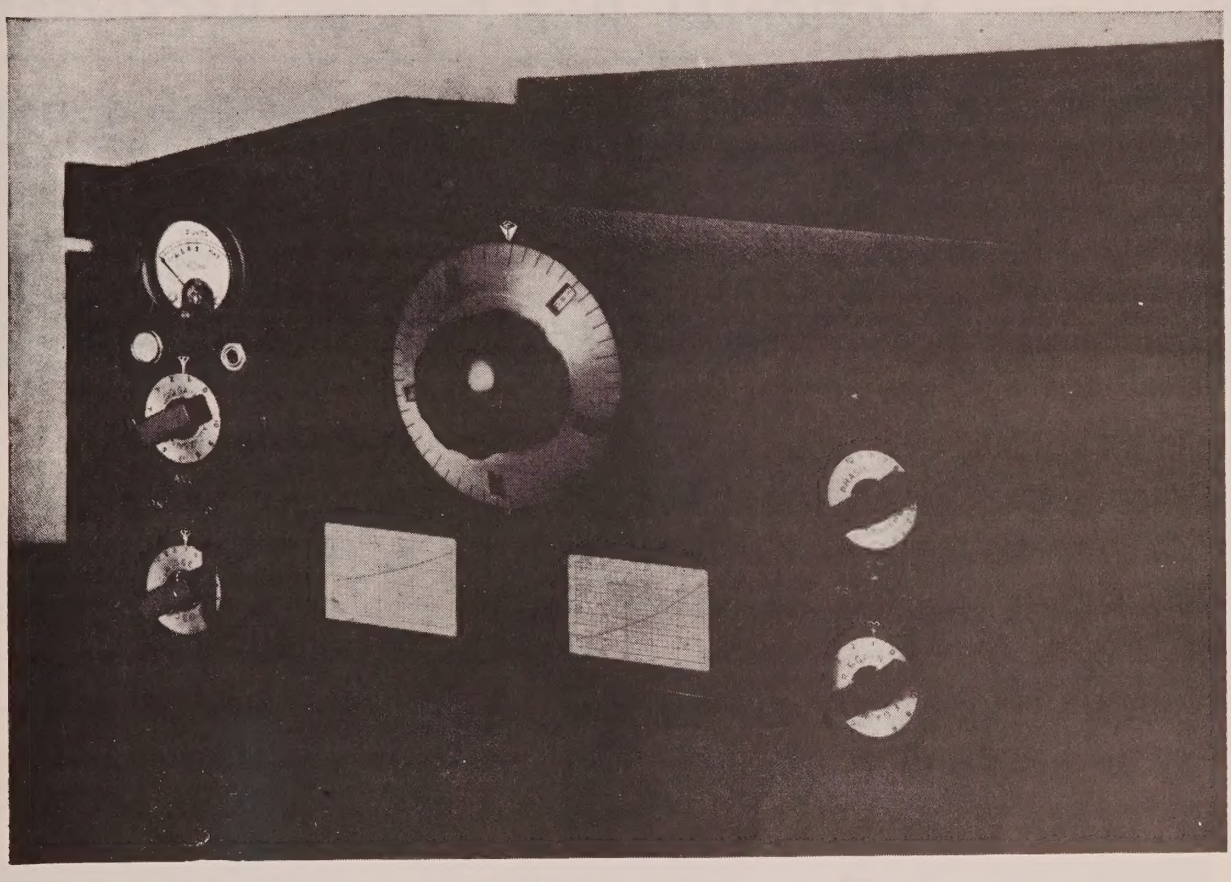
These should be assembled into a folder, along with a picture of the set and its serial number. Furthermore, a great deal of satisfaction is derived from a study of the workings and history of a receiver. And if you have the opportunity to restore another one in the future, a good information file will bring many of the details back.

Finally

Restoration of old electronic equipment is a combination of art, skill, and experience. If you are very fortunate, you know someone who has these attributes and who will teach them to you. Otherwise, you will have to teach yourself.

-K3ZJW-

NATIONAL *High Frequency* RECEIVERS



TYPE HRO AMATEUR RECEIVER

In designing this new receiver National has attempted to meet every requirement of the most advanced amateur. It embodies every feature which we have found to be desirable in such a receiver.

Its circuit is notable in the use of two preselector stages, giving remarkable image-frequency suppression, and weak signal response. The first R.F. stage has been designed to provide maximum gain to minimize effects of Thermal Agitation, and provide highest Signal-to-Noise Ratio. The two high gain I.F. stages employ Litz-wound coils and are tuned with air condensers. As would be expected, the usable sensitivity and selectivity are remarkable.

Other circuit details include automatic or manual volume control (with panel switch), and a vacuum tube voltmeter indicating carrier intensities directly in S. Units. A phone jack is, of course, provided on the front panel, as well as a Send-Receive switch for cutting B Voltages during transmission.

As an aid when operating under adverse conditions, a Lamb Single Signal crystal filter with variable band width precedes the I.F. amplifier. Selectivity is adjustable over a wide range — from several kilocycles for phones to a few cycles for C.W. The circuits are so precisely balanced that heterodyning signals may be completely phased out. All controls are brought out to the front panel.

A flexible input circuit allows any type of doublet or single wire antenna to be used.

Most notable among the mechanical details is the use of the PW precision four-gang condenser, described in detail on Page 2.

Since the performance of any receiver depends upon the loudspeaker, a reliable unit should be chosen with an input impedance of 7000 ohms. The Monitor speaker listed on Page 18 is excellent, or a similar speaker can be furnished in a cabinet to match the HRO at a list price of $30.00.

Tubes required for 2½ volt HRO: Four 58, Three 57, One 2B7, One 2A5. Power Supply requires 1 Type 280.

Tubes required for 6 volt HRO: Four 6D6, Three 6C6, One 6B7, One 42. This receiver recommended primarily for battery operation.

HRO Receiver, 2½ volt or 6 volt model as described above complete with coils, and tubes, but no speaker or power supply. **List Price, $279.50**

Shipping weight 62 pounds

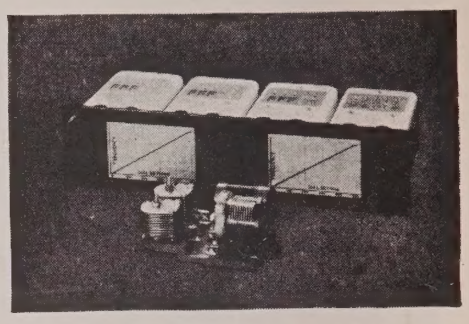
HRO receivers will be supplied with leatherette-finished panel for relay rack mounting at an additional price of **$20.00,** List.

NATIONAL COMPANY, INC., MALDEN, MASS.

NATIONAL *High Frequency* RECEIVERS

OUTSTANDING FEATURES:

- Nine Tubes, not including rectifier.
- Two Preselector Stages.
- Single Signal (Crystal Filter) standard equipment.
- Ganged Plug-in Coils, with each coil individually shielded.
- Strictly single-control Tuning.
- Calibration for each range mounted on coil.
- Four gang Precision Condenser, with preloaded worm-drive tuning, 20–1 ratio.
- Micrometer Dial, spreading tuning over 500 divisions, numbered every 10 divisions, direct reading.
- Automatic or Manual Volume Control.
- Vacuum Tube Voltmeter with Instrument calibrated in S scale of carrier intensity.
- Electron Coupled, air padded oscillators.
- Two I.F. stages with Litz-wound coils, air condenser tuned.
- Beat Frequency Oscillator for "Offset" C.W. Tuning.
- Phone Jack on Panel.

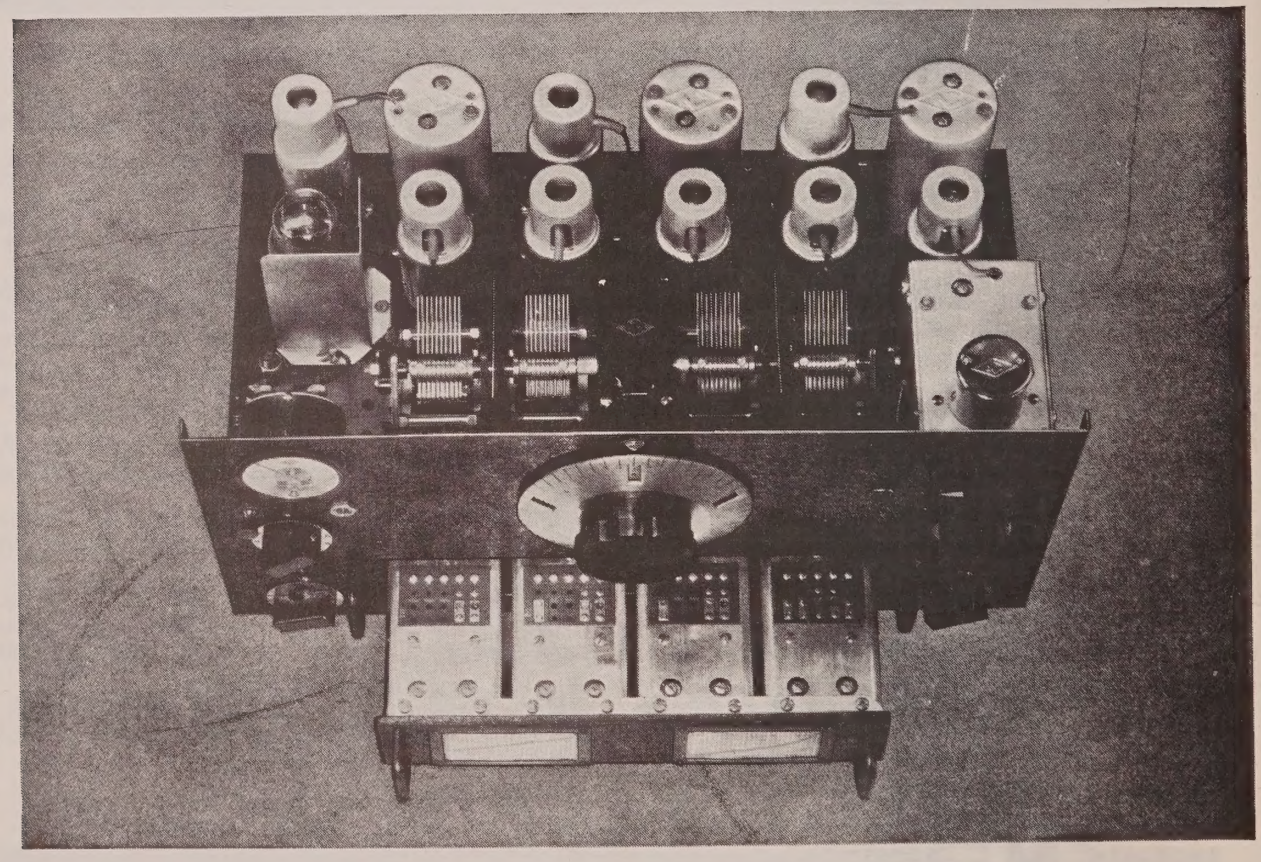


GANGED PLUG-IN COILS CALIBRATED BAND-SPREAD

The plug-in coils of the HRO are ganged for easy handling, and individually shielded for stability. Used as general coverage coils, each range includes two amateur bands and the spectrum between. By a simple switching device, the same coils are changed to band spread the respective amateur bands, spreading them over a uniform span of 400 divisions. All ranges are accurately calibrated at the factory. A complete set of coils for the range from 1.7 MC to 30 MC is supplied as standard equipment with each receiver.

Additional sets of coils are available only as listed below.

175–400 KC.	**List Price, $27.50**
500–1000 KC.	**List Price, $20.00**
900–2000 KC.	**List Price, $20.00**



NATIONAL COMPANY, INC., MALDEN, MASS.

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